SID
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DIABETES PREGNANCY and TECHNOLOGY in Lombardy - 2024

8 GIUGNO 2024 - BERGAMO - OSPEDALE PAPA GIOVANNI XXIII

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Bio-markers molecolari e fattori di rischio genetici

Gabriele Rossi (Milano)

Lorenzo-Almorós *et al. Cardiovasc Diabetol* (2019) 18:140
https://doi.org/10.1186/s12933-019-0935-9

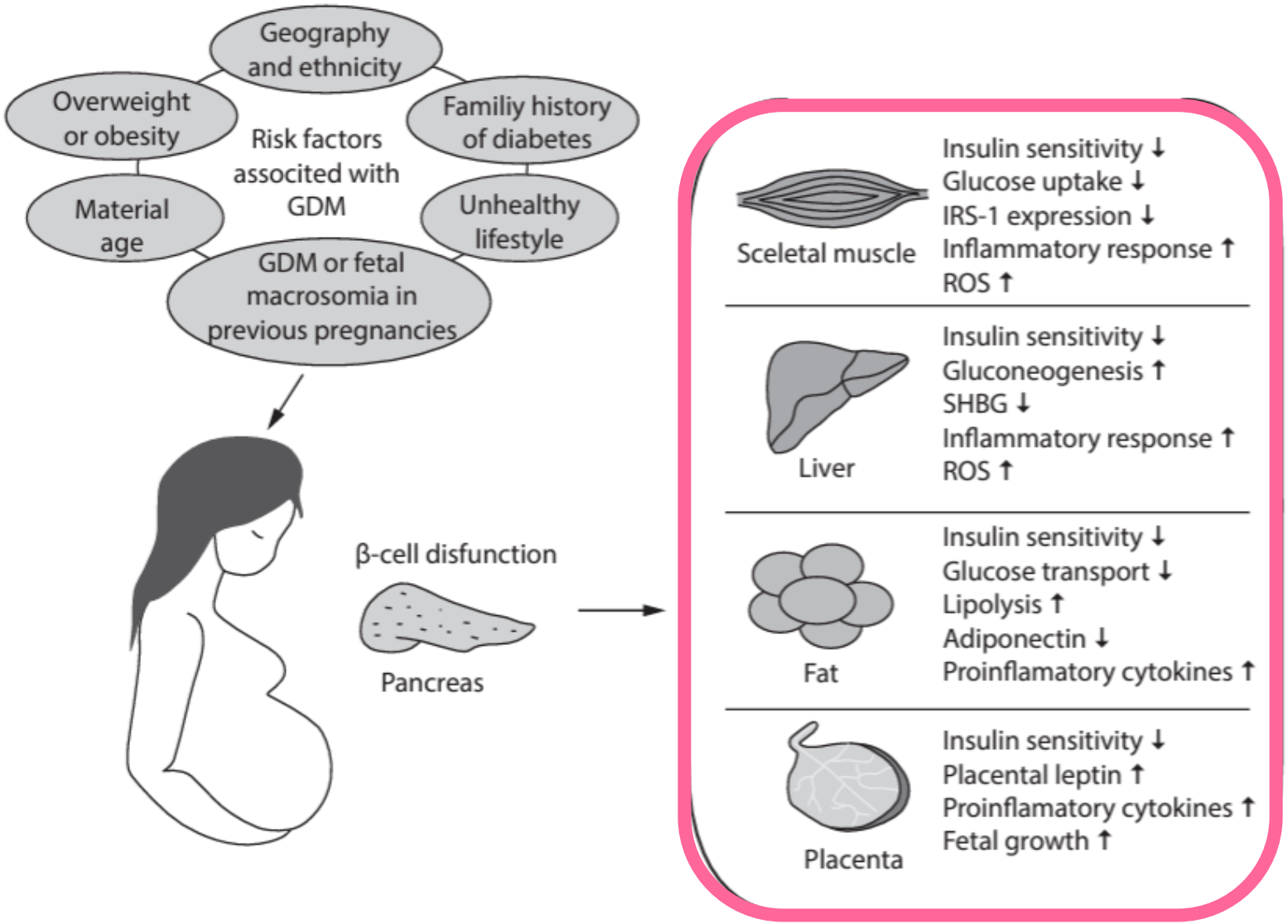
Cardiovascular Diabetology

REVIEW Open Access

Predictive and diagnostic biomarkers for gestational diabetes and its associated metabolic and cardiovascular diseases

A. Lorenzo-Almorós[1], T. Hang[1], C. Peiró[2], L. Soriano-Guillén[3], J. Egido[1,5], J. Tuñón[4] and Ó. Lorenzo[1,5*]

Pathophysiological events specific to GDM



Neurohormonal dysfunction
Inflammatory responce
Oxidative stress
Imbalance of gut microbiome

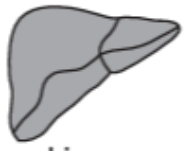
↓

Insulin resistance
Hyperglycaemia

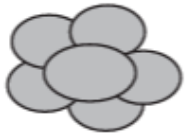
↓

GDM

Biochem Med (Zagreb) 2021;31(3):030502



Liver



Fat

Placenta

Protein biomarker	Main proposed origin	Week of pregnancy	Change in GDM	Metabolic- and cardiovascular-related properties
RBP4	Liver, adipose, breast	1st–12th/16–20th	Higher	Pro-inflammatory Glut4 down-regulation and insulin resistance Endothelial dysfunction
SHBG	Liver, placenta	1st–13th	Lower	Polycystic ovary syndrome Insulin resistance
Afamin	Liver, placenta	1st–12th	Higher	Insulin resistance Metabolic syndrome
FABP4	Adipose, placenta	4–6th/23rd–30th	Higher	Fatty acid uptake, transport, and metabolism
hs-CRP	Liver, pancreas, adipose	4–6th/11–14th 16–18th/24–28th	Higher	Pro-inflammatory of acute response
Adiponectin	Adipose, breast	6th–32nd	Lower	Anti-inflammatory and anti-atherogenesis Insulin-sensitizer
Visfatin	Adipose, placenta	11–13th	Higher	Pro-inflammatory and chemotactic Endothelial dysfunction Acute myocardial infraction
Fetuin-A	Liver, placenta, fetal tissues	11–14th	Lower	Pro-inflammatory Regulation of the insulin receptor Vessel calcification
Omentin-1	Adipose, placenta	12–15th	Lower	Anti-inflammatory Vasodilatation and endothelial function
IL-6	Adipose, lung	12–15th	Higher	Pro-inflammatory Atherogenesis and DM
Leptin	Adipose, breast	14–20th/24–28th	Higher	Reduction on insulin action and appetite Pro-oxidant and pro-inflammatory Arterial stiffness
Ficolin-3	Liver, placenta	16th–18th	Lower	Insulin resistance T2DM development

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Placenta Secreted Factors

Genetic biomarker	Main proposed origin	Week of pregnancy	Change in GDM	Metabolic- and cardiovascular-related properties
miR-16-5p	Placenta	4–6th/16th	Higher	Pro-inflammatory Regulation of vascular endothelial growth
miR-17-5p	Placenta	4–6th/16th	Higher	Insulin resistance Regulation of angiogenesis Hypertension
miR-20a-5p	Placenta	4–6th/16th	Higher	Regulation of LDL receptor Modulation of aerobic cardiac capacity Coronary artery disease
miR-21-3p	Placenta	7th–23rd/30–36th	Higher	Pro-inflammatory Insulin resistance
miR-29a	Placenta	16th	Lower	Repression of insulin-signaling Regulation of Glut4 Control of fatty acid/glucose metabolism
miR-132	Placenta	16th	Lower	Insulin secretion Enhancement of glucose homeostasis
miR-222	Placenta	16th	Lower	Insulin resistance Downregulation of Glut4 Hypercholesterolemia
miR-19a/b-3p	Placenta	16th	Higher	Pro-inflammatory Insulin resistance Vascular injury

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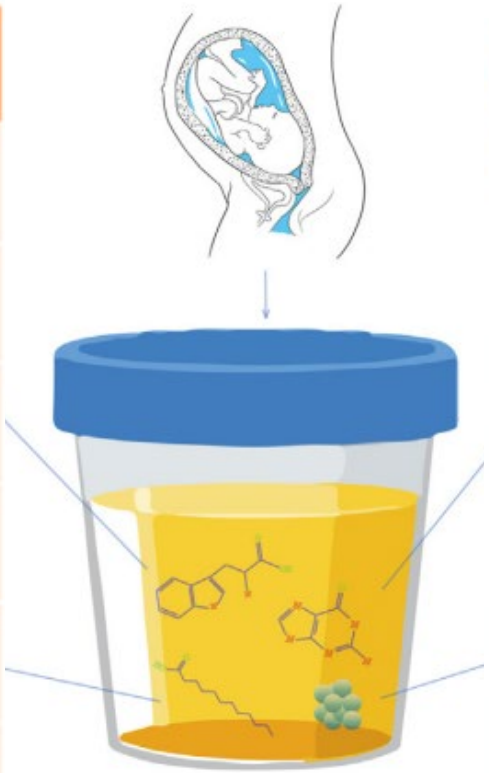
Urine Secreted Metabolities

GDM-PREDICTION

Metabolite biomarker	Source	Week of pregnancy	Change in GDM
AHBA	Urine/plasma	12–26th	Higher
BHBA	Urine/plasma	12–26th	Higher
Valine	Urine/plasma	12–26th	Higher
Alanine	Urine/plasma	12–26th	Higher
Serotonin	Urine/plasma	12–26th	Higher
L-Tryptophan	Urine/plasma	12–28th	Higher



GDM-DIAGNOSIS

Metabolite biomarker	Source	Week of pregnancy	Change in GDM
L-Urobilinogen	Urine	24–28th	Higher
Ceramide (d18:0/23:0)	Urine	24–28th	Higher
21-Deoxycortisol	Urine	24–28th	Higher
Cucurbitacin-C	Urine	24–28th	Higher
Aspartame	Urine	24–28th	Higher

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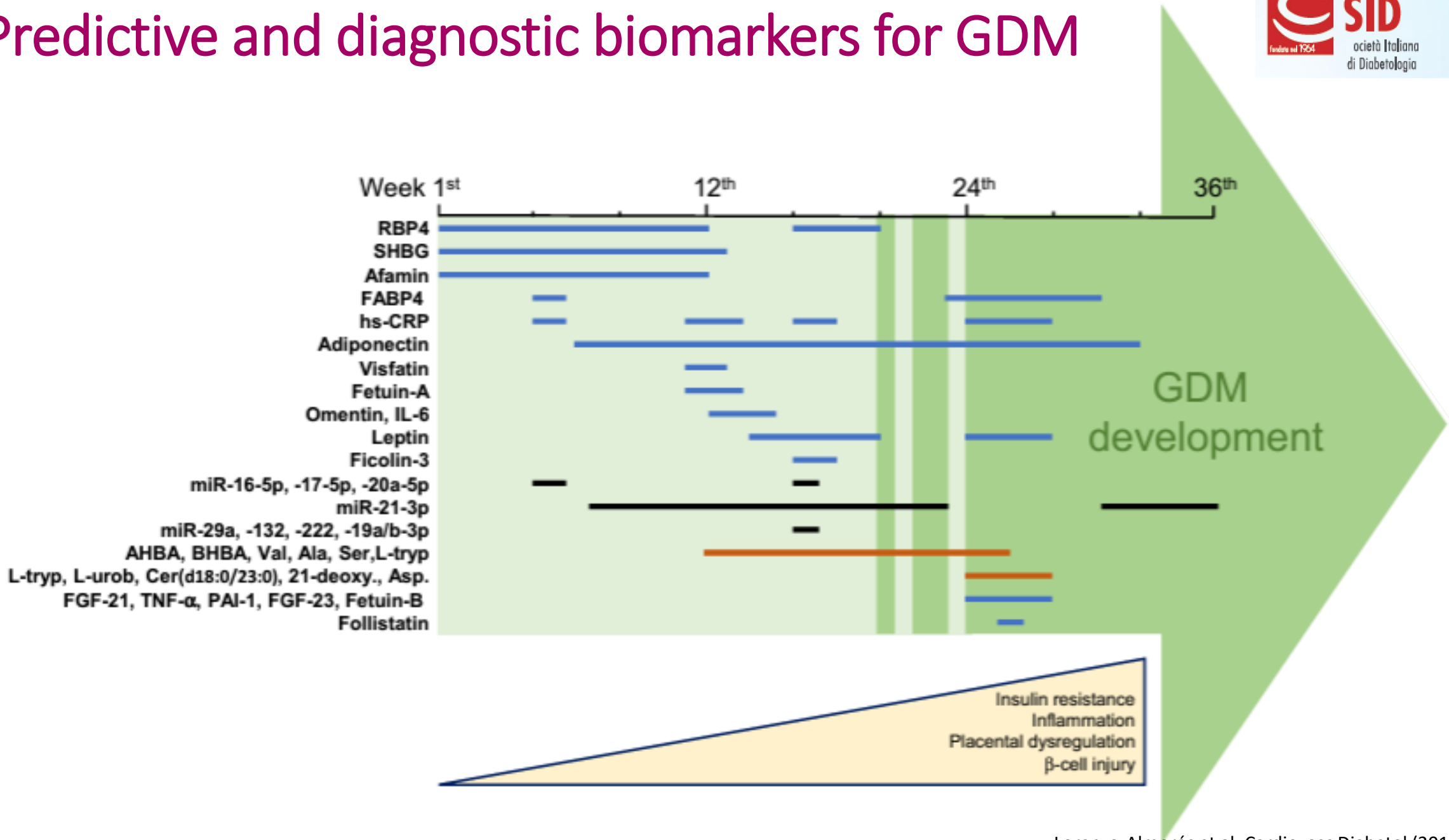
Predictive and diagnostic biomarkers for GDM



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Sensitivity and Specificity of candidate biomarkers of GDM

Biomarker	Week of pregnancy	Sensitivity (%)	Specificity (%)
SHGB	1st–12th	85.0	55.3
hs-CRP	4–6th	89.0	55.3
	11–14th	86.2	50.8
FGF-21	24–28th	100.0	75.0
miR-16-5p	4–6th	41.6	95.8
miR-17-5p	4–6th	21.4	95.4
miR-20a-5p	4–6th	17.8	95.4
FABP4	4–6th	81.8	71.2
	23rd–30th	87.0	89.0
Adiponectin	16–18th	80.7	65.1
	24–28th	83.6	56.6
RBP4	16–18th	79.4	79.1
		63.6	75.0
Leptin	24–28th	81.2	64.2
miR-132	16th	66.7	63.3
miR-29a			
miR-222			
Ficolin-3	16–18th	51.1	97.7
Fetuin-A	11–14th	58.6	76.2
miR-21-3p	30–36th	52.6	89.3

90.9%

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- **Una diminuzione nel I trimestre di SHBG plasmatico e di adiponectina, in combinazione con livelli elevati di RBP4, afamina, ficolina-3 e alcuni miR (miR-16-5p, miR-17-5p e miR-20a-5p) potrebbero predire il GDM con determinate garanzie.**

- **Nel III trimestre, un aumento dei livelli plasmatici di FGF-21 e FABP4 potrebbe migliorare la capacità dell'OGTT di diagnosticare il GDM. Inoltre, le predisposizioni allo sviluppo di CVD associate al GDM possono essere previste o diagnosticate aggiungendo visfatina, omentina-1, fetuina-A, IL-6, PAI-1 e FGF-21/23 al pannello di biomarcatori del GDM.**

BIOMARKERS

- **L'identificazione di precoci biomarkers in gravidanze che potrebbero sviluppare il GDM potrebbe condurre ad una miglior comprensione della patogenesi del GDM**

- **CARATTERISTICHE DEL BIOMARKER: Facile da misurare, riproducibile e che predice il GDM con un alto grado di accuratezza e consistenza**

- **La combinazione di biomarkers e fattori di rischio in un modello può contribuire alla predizione precoce del GDM. E' necessario dimostrare l'associazione tra le misurazioni dei markers nel I trimestre (durante il test per la diagnosi prenatale?) e la successiva diagnosi di GDM nel II trimestre in studi longitudinali (intelligenza artificiale?)**

World Journal of Diabetes

Submit a Manuscript: https://www.f6publishing.com

World J Diabetes 2023 November 15; 14(11): 1693-1709

DOI: 10.4239/wjd.v14.i11.1693

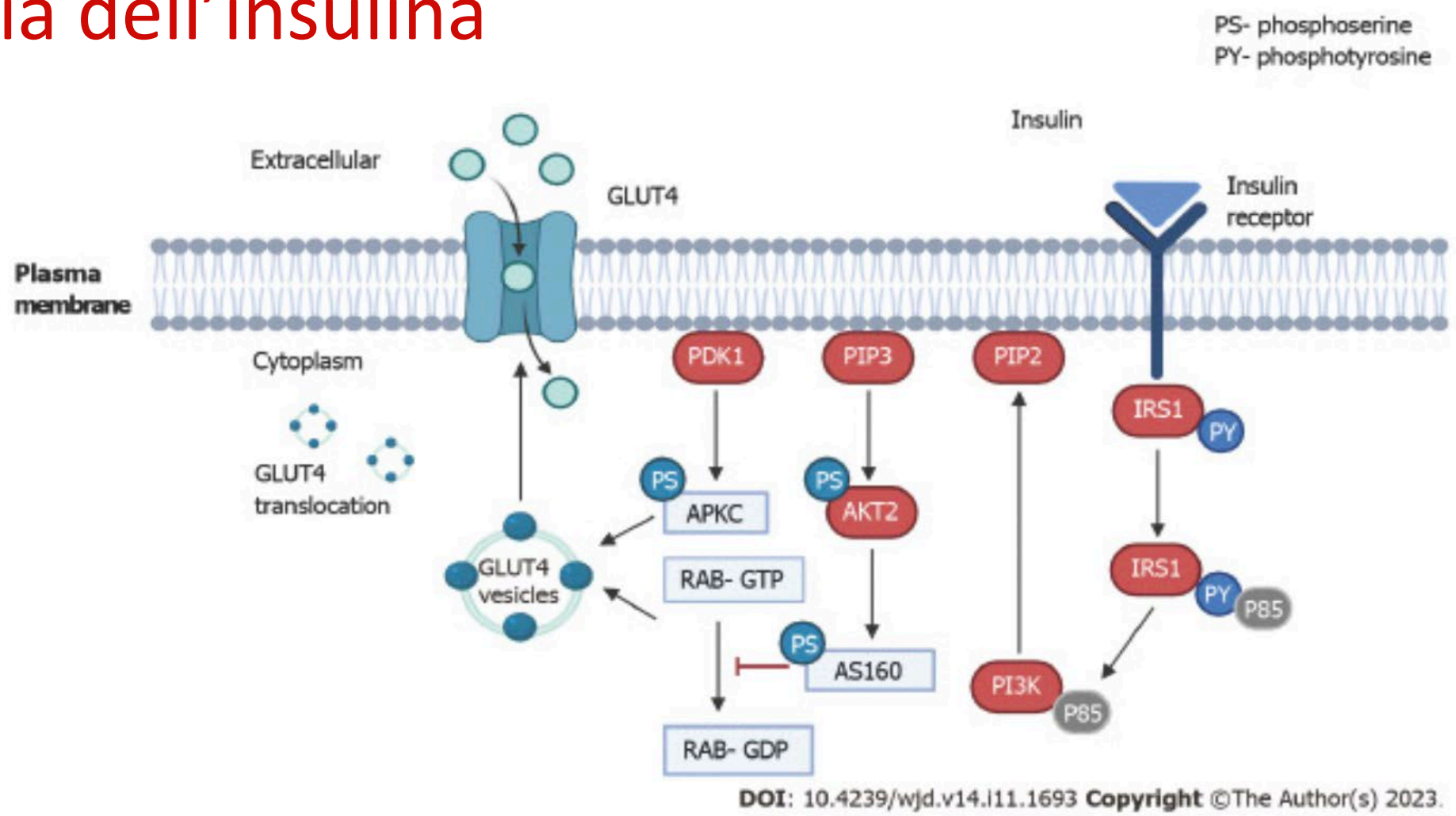
ISSN 1948-9358 (online)

SYSTEMATIC REVIEWS

Cellular and molecular overview of gestational diabetes mellitus: Is it predictable and preventable?

Pei-Qi Lim, Yen-Ju Lai, Pei-Ying Ling, Kuo-Hu Chen

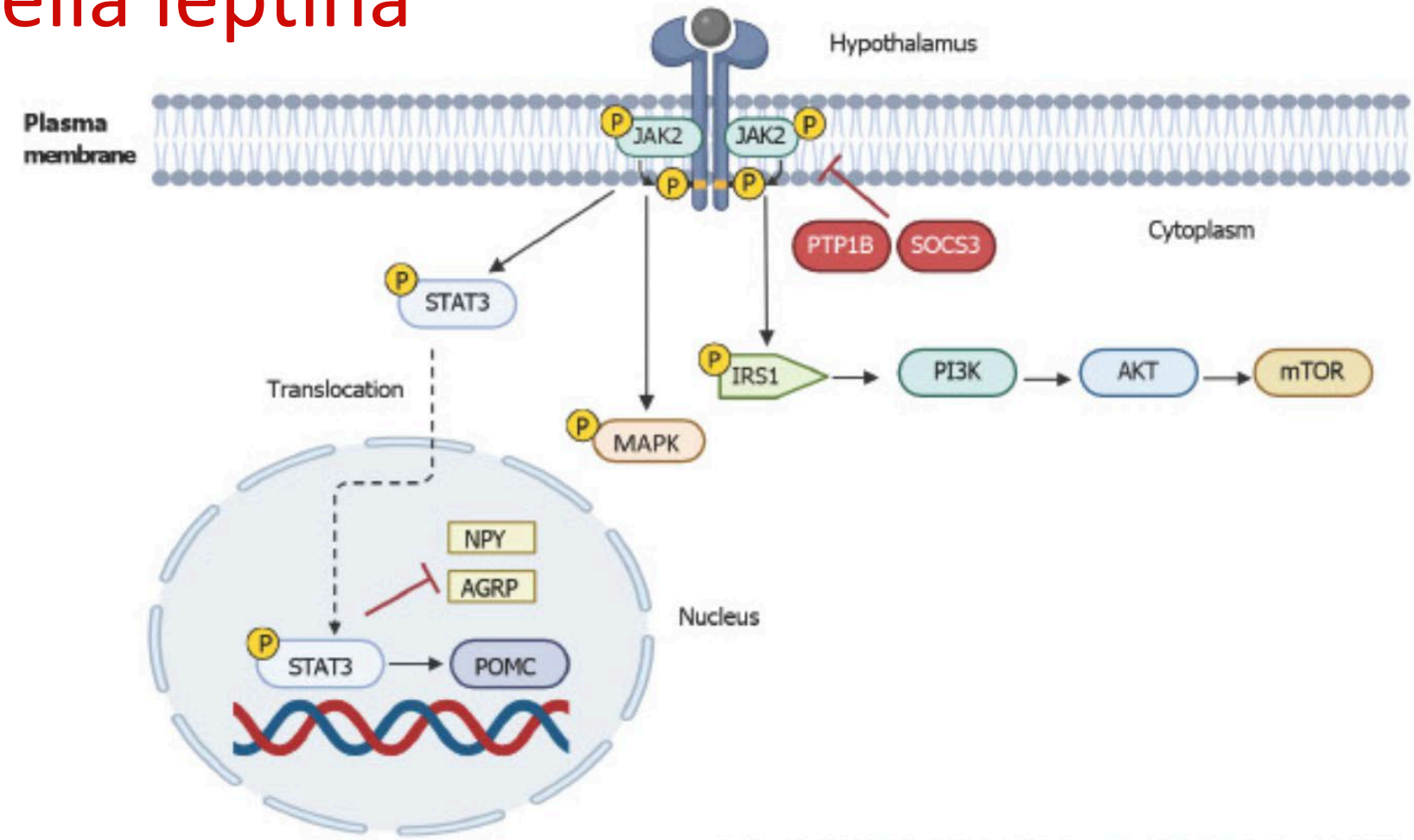
La via dell'insulina



DOI: 10.4239/wjd.v14.i11.1693 **Copyright** ©The Author(s) 2023.

Figure 2 A brief summary of insulin signaling and subsequent glucose transporter 4 translocation that implicate the cellular and molecular mechanisms of gestational diabetes mellitus. AKT: Protein kinase B; APKC: Atypical protein kinases C; GDP: Guanosine diphosphate; GLUT4: Glucose transporter 4; GTP: Guanosine triphosphate; IRS: Insulin receptor substrate; PI3K: Phosphatidylinositol 3 kinase; PDK1: Phosphoinositide-dependent protein kinase 1.

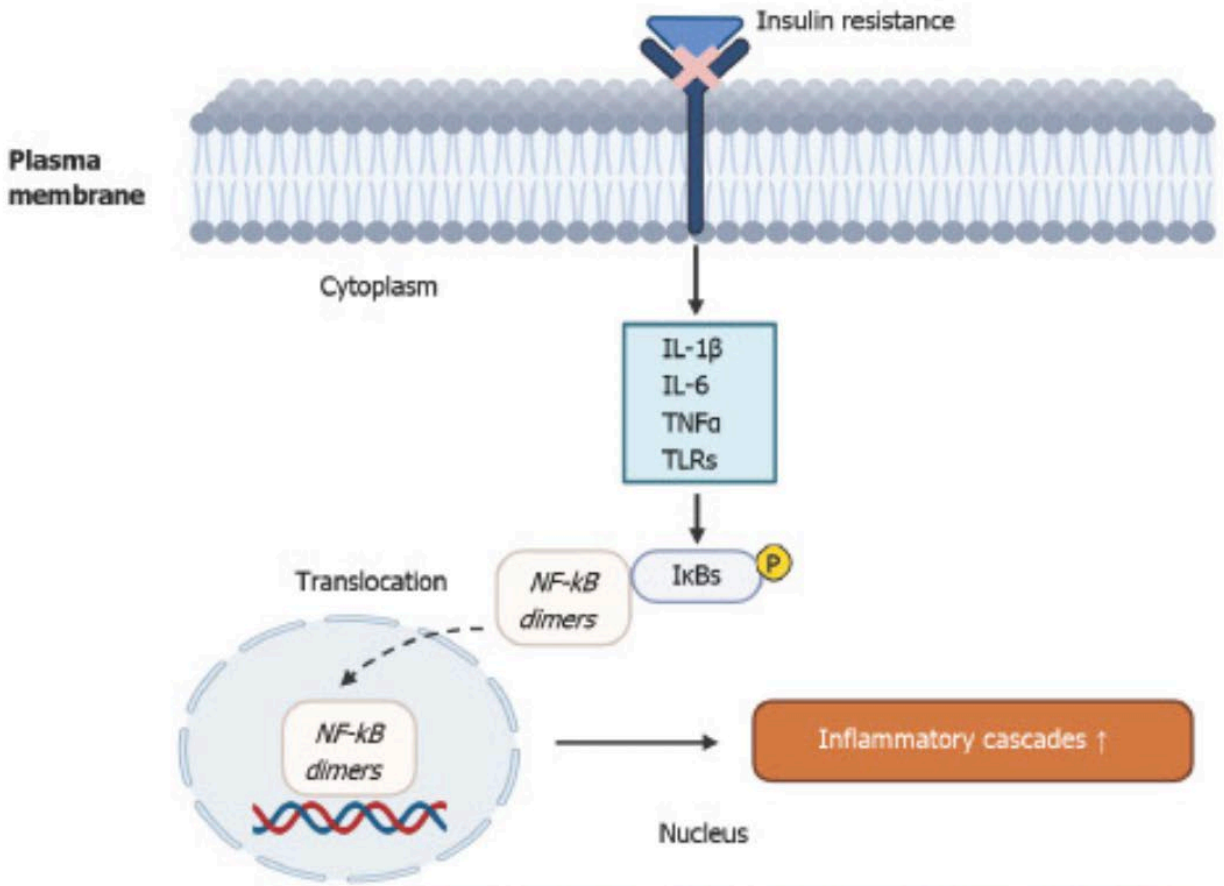
La via della leptina



DOI: 10.4239/wjd.v14.i11.1693 **Copyright** ©The Author(s) 2023.

Figure 3 Brief summary of leptin signaling pathways, in which leptin can bind to the leptin receptor and activate JAK2, signal transducer and activator of transcription 3, and MAPK *via* phosphorylation of different sites on the leptin receptor and subsequent reaction to downstream molecules to exert its anorexigenic effect. AgRP: Agouti-related peptide; AKT: Protein kinase B; IRS: Insulin receptor substrate; NPY: Neuropeptide Y; PI3K: Phosphatidylinositol 3 kinase; POMC: Polypeptide pro-opiomelanocortin; PTP1B: Protein tyrosine phosphatase 1B; SOCS3: Suppressor of cytokine signaling 3; STAT3: Signal transducer and activator of transcription 3.

La via del fattore nucleare kappa-B



DOI: 10.4239/wjd.v14.i11.1693 **Copyright** ©The Author(s) 2023.

Figure 4 Brief summary of the nuclear factor-kappa B signaling pathway. As suppressors, the inhibitory regulators of nuclear factor-kappa B (NF-κB) can bind to the NF-κB dimers to form a complex, which remains sequestered and inactive in the cytoplasm of non-stimulated cells. Under the status of insulin resistance, proinflammatory cytokines (IL-1β, IL-6, and TNFα) and toll-like receptors are increased to initiate the phosphorylation and degradation of inhibitory regulators of NF-κB to expose a nuclear localization sequence on the NF-κB proteins. Thus, the NF-κB dimers translocate to the nucleus to regulate gene transcription and induce inflammatory cascades. IκB: Inhibitory regulators of nuclear factor-kappa B; TLR: Toll-like receptor.

Review

The integrative biology of type 2 diabetes

https://doi.org/10.1038/s41586-019-1797-8

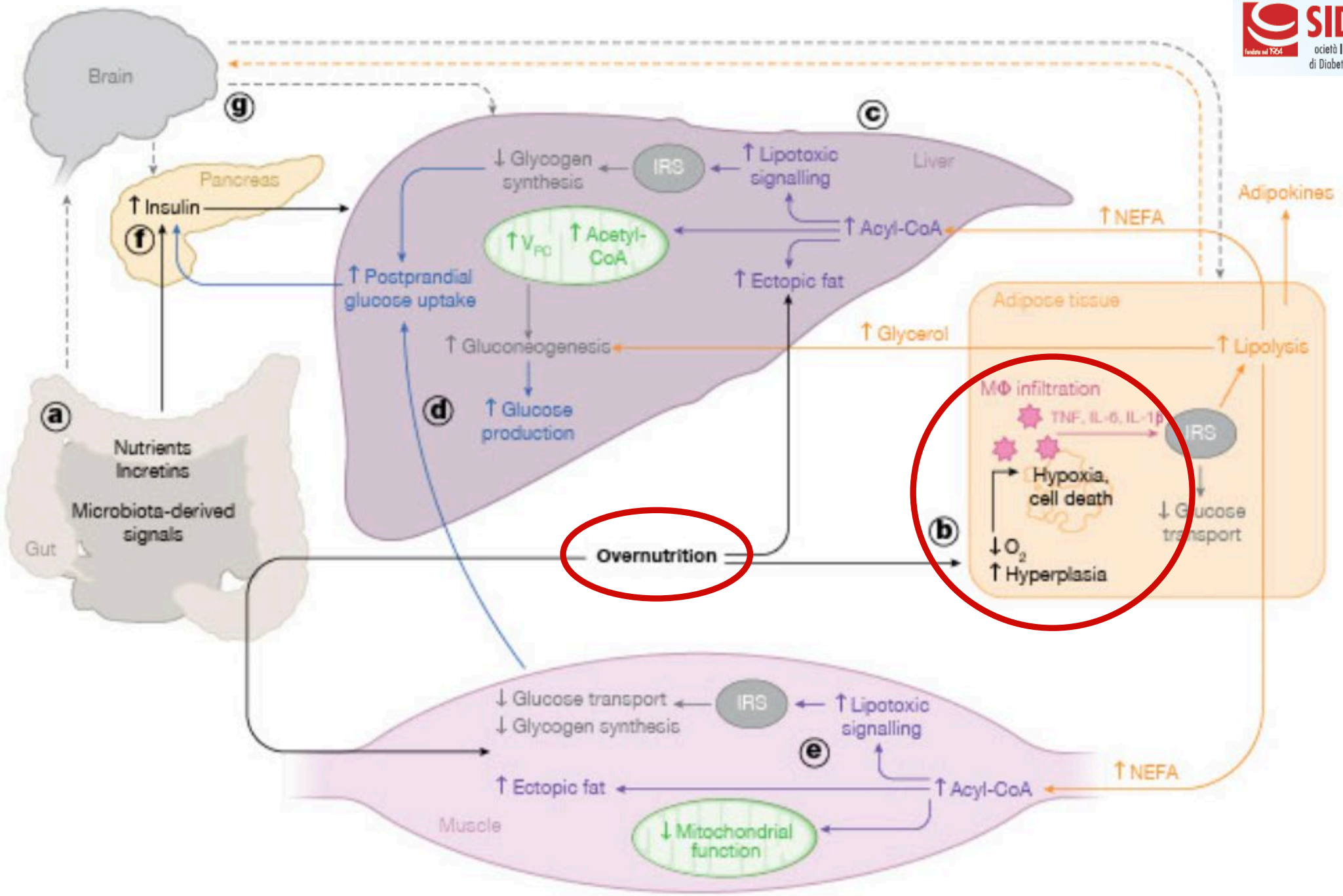
Received: 27 March 2019

Accepted: 18 September 2019

Published online: 4 December 2019

Michael Roden[1,2,3*] & Gerald I. Shulman[4*]

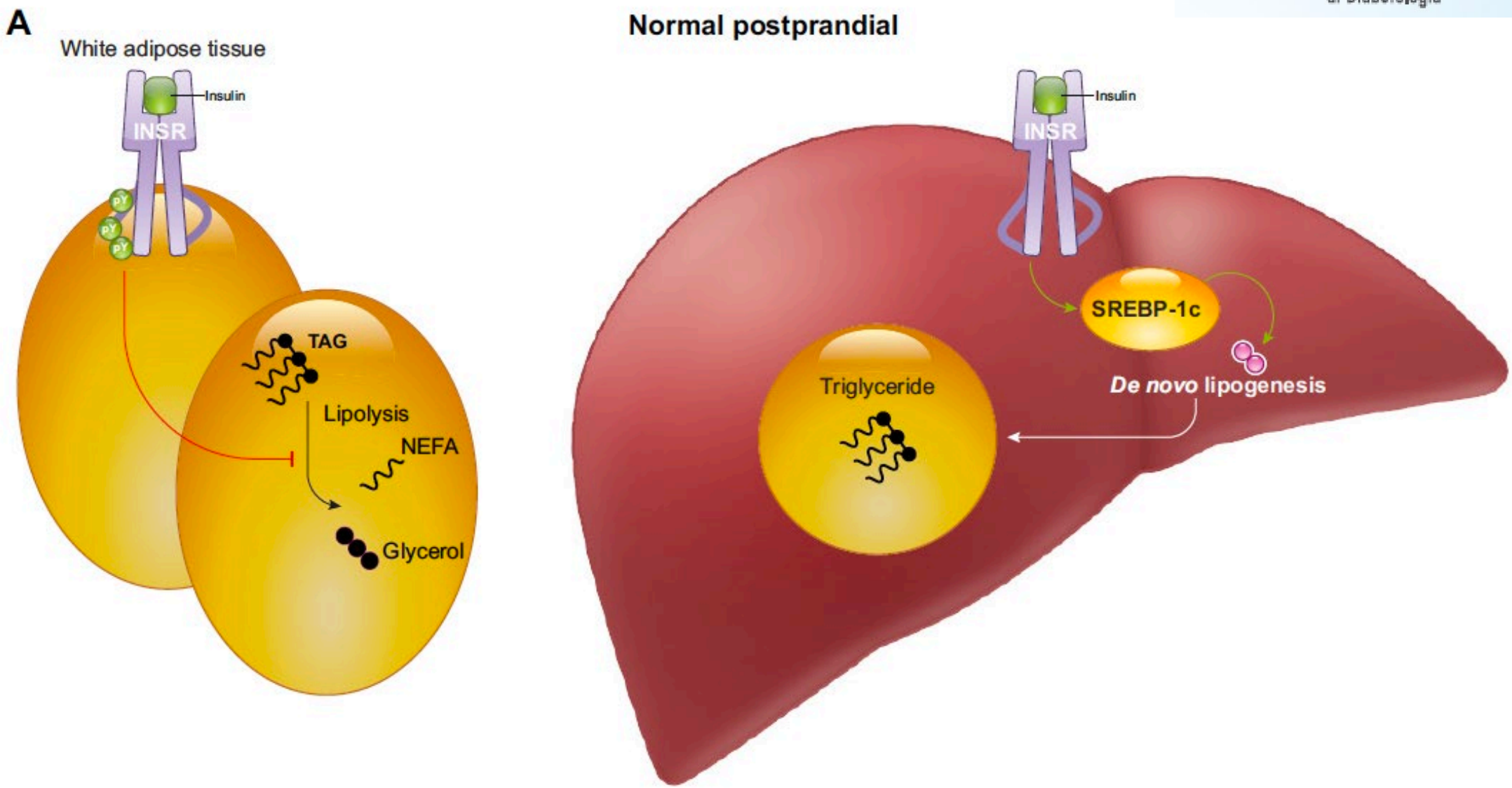
Obesity and type 2 diabetes are the most frequent metabolic disorders, but their causes remain largely unclear. Insulin resistance, the common underlying abnormality, results from imbalance between energy intake and expenditure favouring nutrient-storage pathways, which evolved to maximize energy utilization and preserve adequate substrate supply to the brain. Initially, dysfunction of white adipose tissue and circulating metabolites modulate tissue communication and insulin signalling. However, when the energy imbalance is chronic, mechanisms such as inflammatory pathways accelerate these abnormalities. Here we summarize recent studies providing insights into insulin resistance and increased hepatic gluconeogenesis associated with obesity and type 2 diabetes, focusing on data from humans and relevant animal models.


Brain
g
c
Liver
↓ Glycogen synthesis
IRS
↑ Lipotoxic signalling
Pancreas
↑ Insulin
f
↑ V_{PC}
↑ Acetyl-CoA
↑ Acyl-CoA
↑ NEFA
Adipokines
↑ Postprandial glucose uptake
↑ Ectopic fat
Adipose tissue
↑ Glycerol
↑ Gluconeogenesis
↑ Lipolysis
d
↑ Glucose production
MΦ infiltration
TNF, IL-6, IL-1β
IRS
a
Nutrients
Incretins
Microbiota-derived signals
Gut
Hypoxia, cell death
↓ Glucose transport
b
Overnutrition
↓ O_2
↑ Hyperplasia
↓ Glucose transport
↓ Glycogen synthesis
IRS
↑ Lipotoxic signalling
e
↑ NEFA
↑ Ectopic fat
↑ Acyl-CoA
Muscle
↓ Mitochondrial function

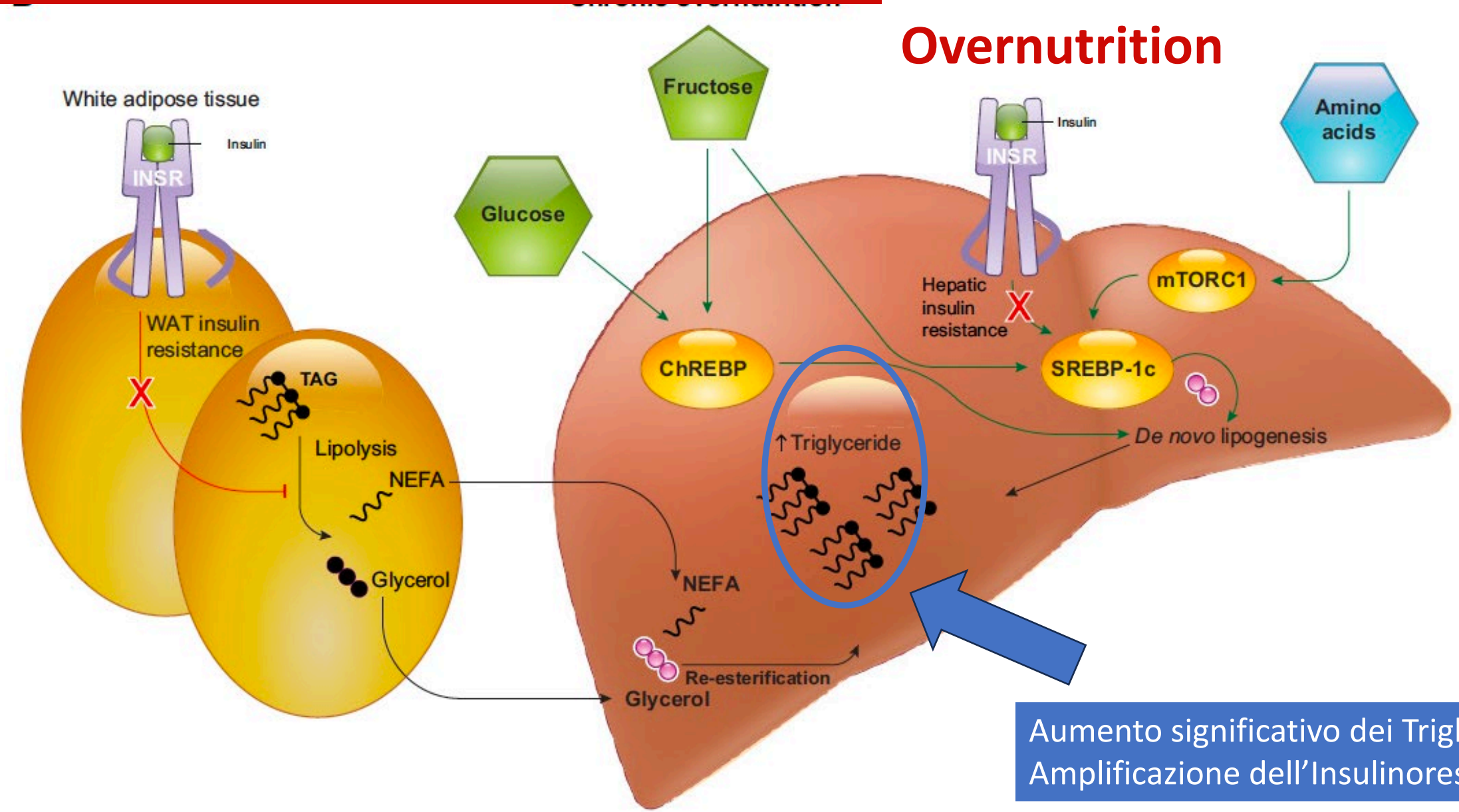
Physiol Rev 98: 2133–2223, 2018
Published August 1, 2018; doi:10.1152/physrev.00063.2017

MECHANISMS OF INSULIN ACTION AND INSULIN RESISTANCE

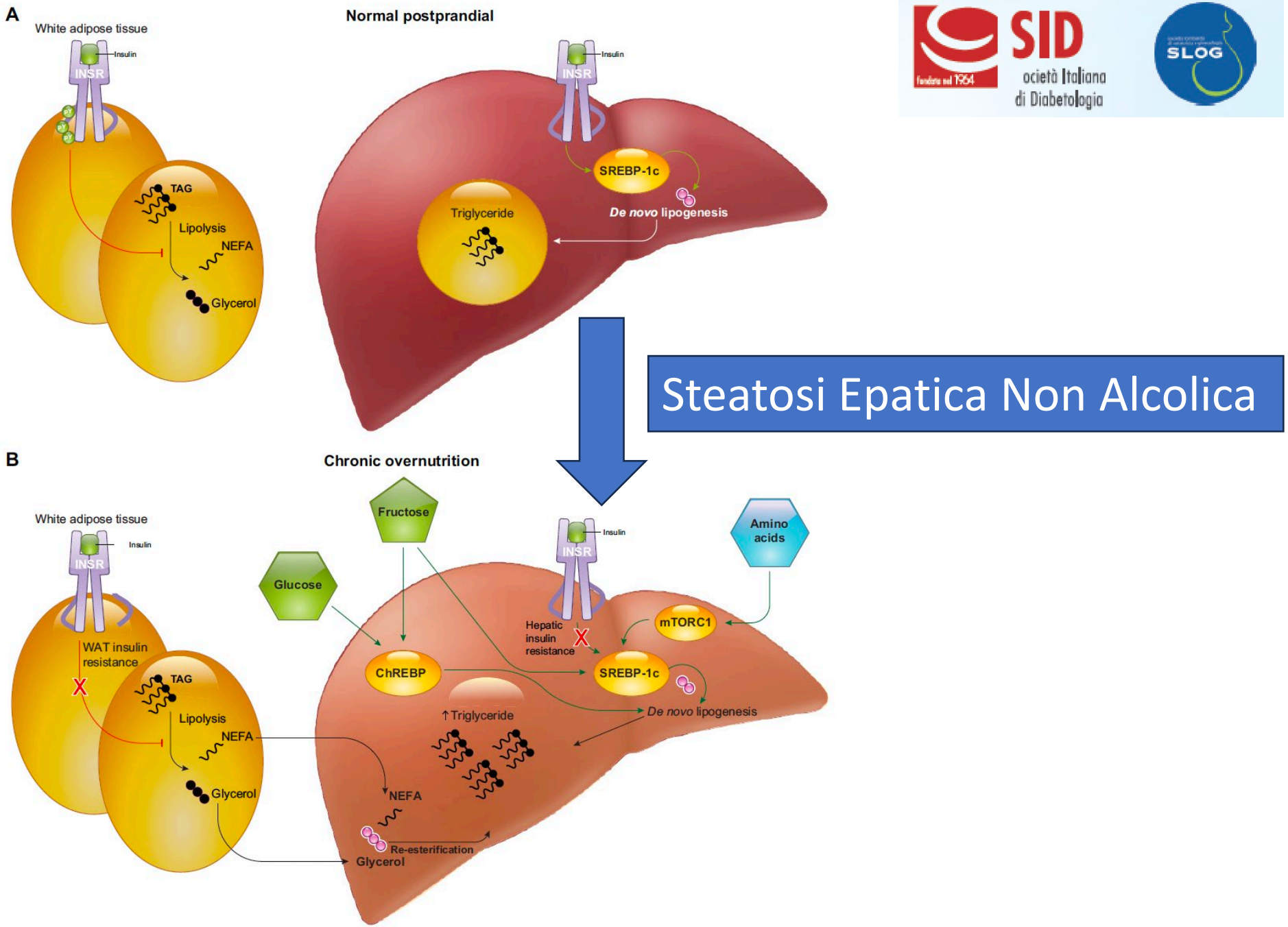
Max C. Petersen and Gerald I. Shulman


A
White adipose tissue
Insulin
INSR
pY
pY
pY
TAG
Lipolysis
NEFA
Glycerol
Normal postprandial
Insulin
INSR
SREBP-1c
Triglyceride
De novo lipogenesis

Steatosi Epatica Non Alcolica
Eccesso di substrati in condizioni di insulinoresistenza



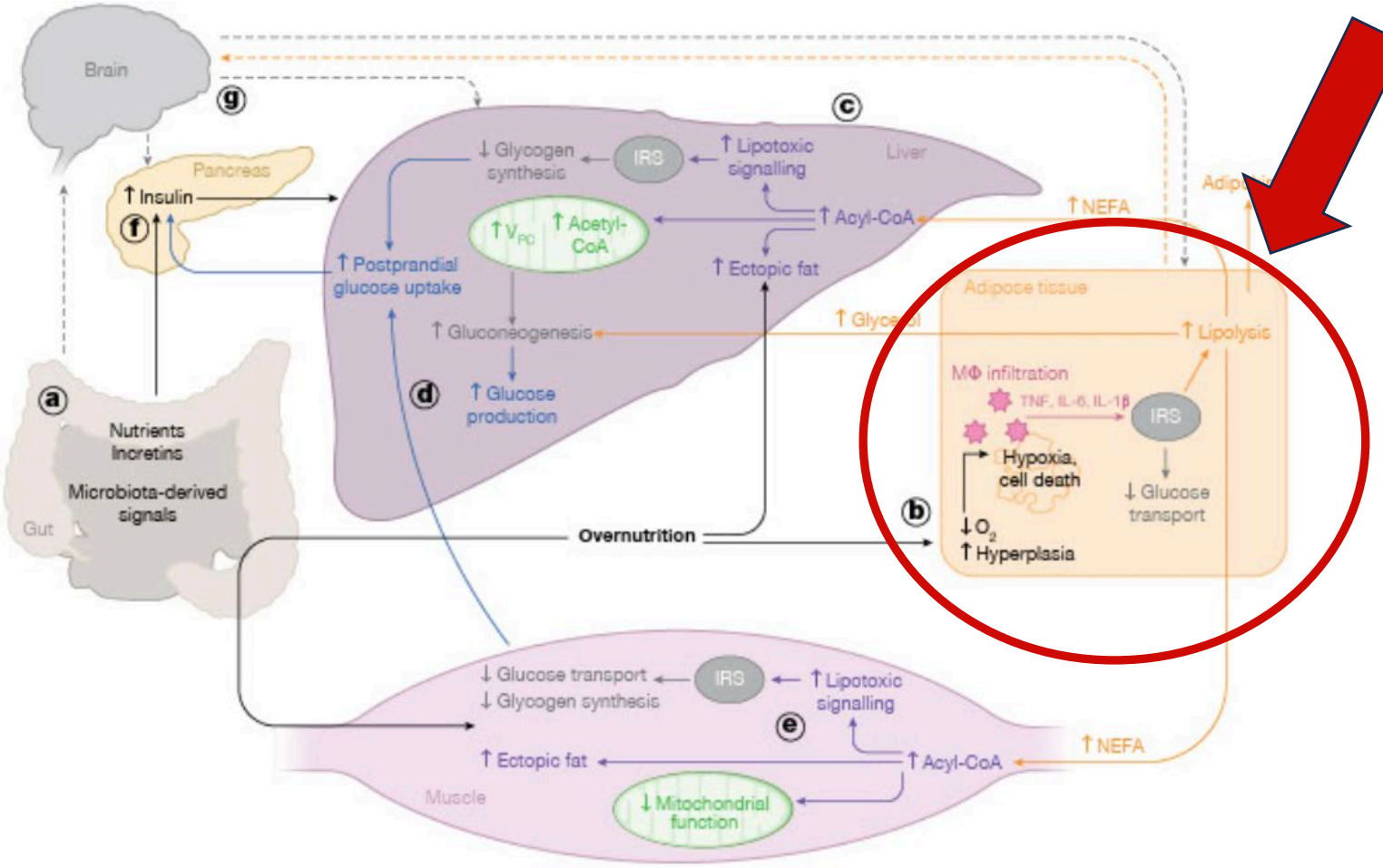
Aumento significativo dei Trigliceridi
Amplificazione dell'Insulinoresistenza



Steatosi Epatica Non Alcolica

Ruolo centrale del tessuto adiposo viscerale nella genesi e nell'amplificazione dell'insulinoresistenza

Ruolo centrale del tessuto adiposo viscerale nella genesi e nell'amplificazione dell'insulinoresistenza



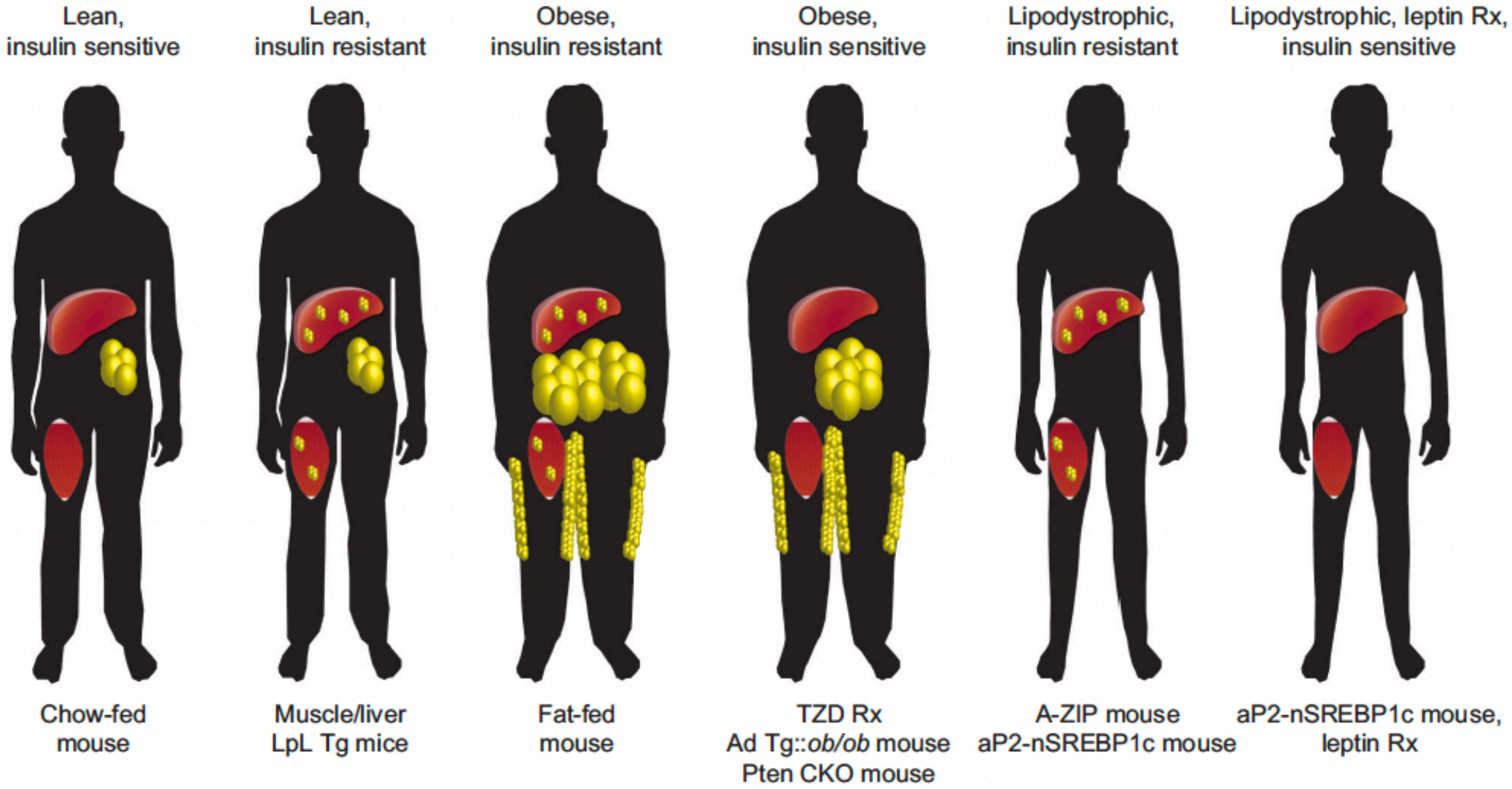


FIGURE 13. Ectopic lipid hypothesis of liver and muscle insulin resistance. The central organizing principle is that lipid storage in white adipose tissue, especially in subcutaneous depots, is physiologically appropriate, but lipid storage in liver and skeletal muscle is inappropriate and metabolically harmful. Lipid accumulation at these "ectopic" sites is associated with insulin resistance. Human phenotypes are listed above silhouettes, and corresponding mouse models, described in the main text, are below.

E’possibile misurare il tessuto adiposo viscerale in gravidanza?

Original Paper

Fetal Diagnosis and Therapy

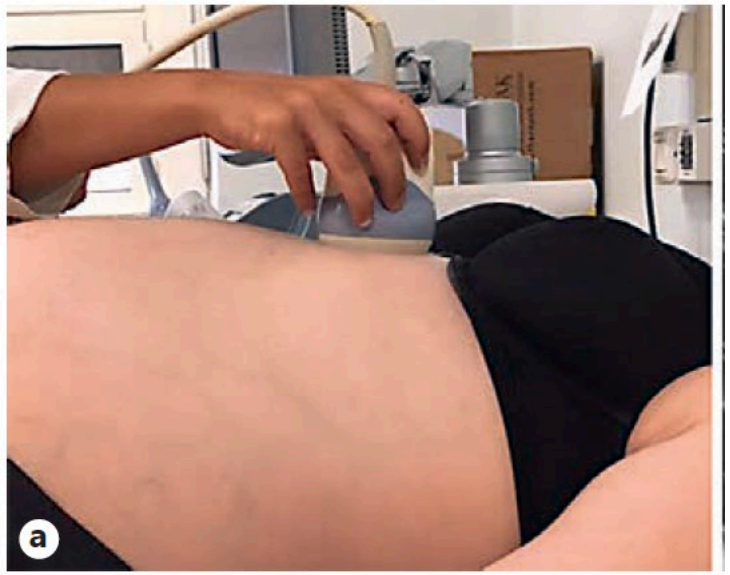
Fetal Diagn Ther 2018;43:143–147
DOI: 10.1159/000475988

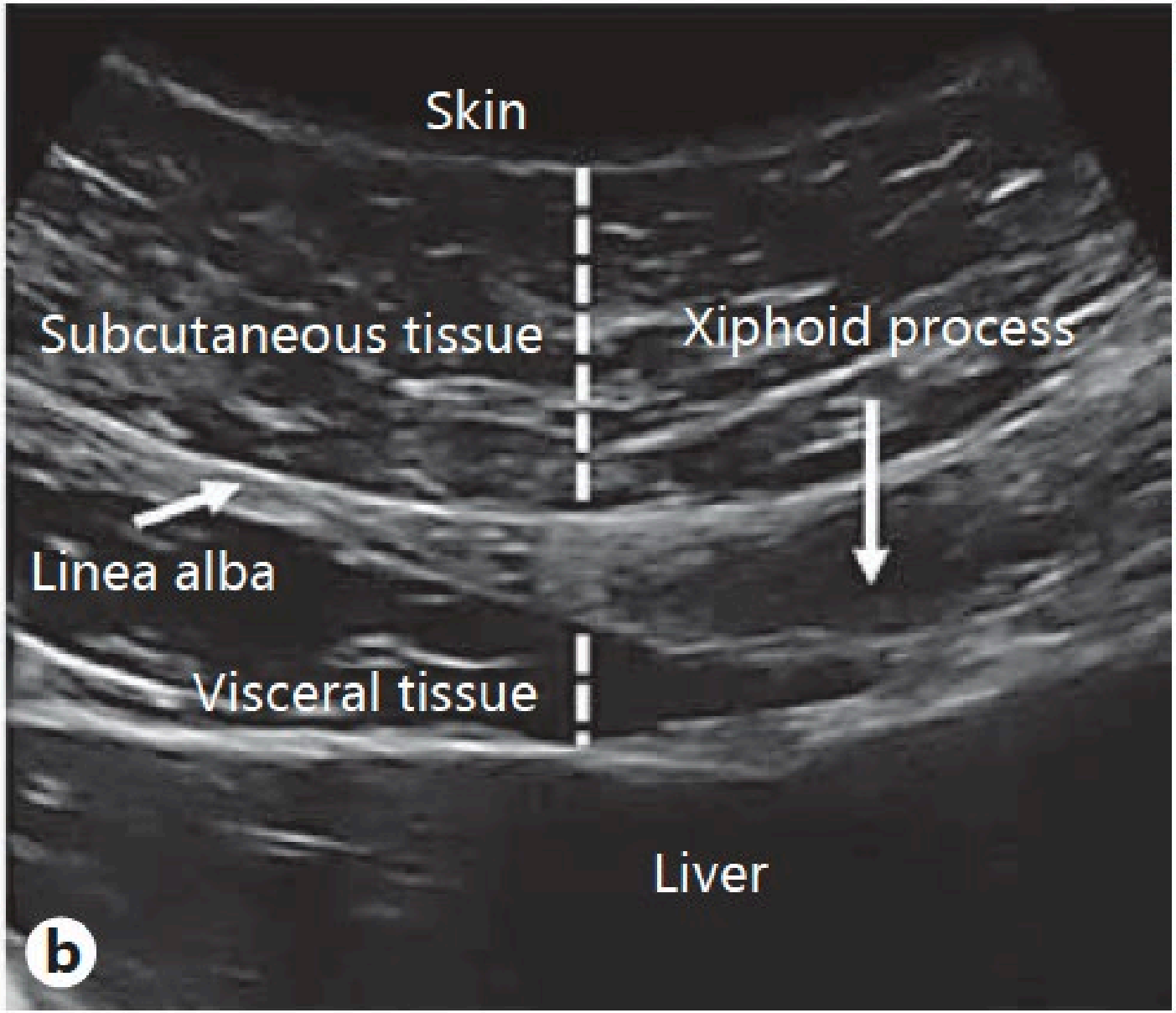
Received: September 5, 2016
Accepted after revision: April 21, 2017
Published online: June 17, 2017

Maternal Subcutaneous and Visceral Adipose Ultrasound Thickness in Women with Gestational Diabetes Mellitus at 24–28 Weeks' Gestation

Francesco D'Ambrosi[a] Francesca Crovetto[a] Enrico Colosi[b] Isabella Fabietti[a] Floriana Carbone[a] Beatrice Tassis[a] Silvia Motta[a] Alessandro Bulfoni[c] Luigi Fedele[a] Gabriele Rossi[a] Nicola Persico[a]

[a]Department of Obstetrics and Gynecology "L. Mangiagalli," Fondazione IRCCS "Ca' Granda" – Ospedale Maggiore Policlinico, Milan, [b]Department of Obstetrics and Gynecology, Reproductive Medicine and Fetal Medicine Unit – Misericordia Hospital, Grosseto, and [c]Department of Obstetrics and Gynecology, Humanitas San Pio X, Milan, Italy





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Fondata nel 1964
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Original Paper

Fetal Diagnosis and Therapy

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Maternal Subcutaneous and Visceral Adipose Ultrasound Thickness in Women with Gestational Diabetes Mellitus at 24–28 Weeks' Gestation

Table 2. Logistic regression analysis to examine the relationship between gestational diabetes and maternal demographic and biophysical variables

Variable	Univariate analysis			Multivariate analysis		
	OR	95% CI	*p* value	OR	95% CI	*p* value
Maternal age (years)	1.163	1.077–1.256	<0.001	1.164	1.053–1.286	0.003
Family history of diabetes	4.231	1.909–9.375	<0.001	4.470	1.690–11.825	0.003
Body mass index	1.115	1.028–1.210	0.009	1.172	1.062–1.295	0.002
Subcutaneous adipose tissue (MoM)	1.537	0.623–3.789	0.0351	–		–
Visceral adipose tissue (MoM)	35.92	10.716–120.41	<0.001	34.047	9.489–122.166	<0.001

OR, odds ratio; CI, confidence interval; MoM, multiples of the median.

Il tessuto adiposo viscerale è un fattore di rischio indipendente per lo sviluppo di Diabete gestazionale

E’possibile misurare il tessuto adiposo viscerale nel I trimestre?

(quando si effettua il test della diagnosi prenatale)

Received: 21 August 2019 | Revised: 22 December 2019 | Accepted: 29 December 2019

DOI: 10.1111/aogs.13800

ORIGINAL RESEARCH ARTICLE

Ultrasound assessment of maternal adipose tissue during 1st trimester screening for aneuploidies and risk of developing gestational diabetes

Francesco D'Ambrosi[1] | Gabriele Rossi[1] | Chiara M. Soldavini[1] | Matteo Di Maso[2] | Ilma F. Carbone[1] | Giulia E. Cetera[1] | Enrico Colosi[3] | Enrico Ferrazzi[1,4]

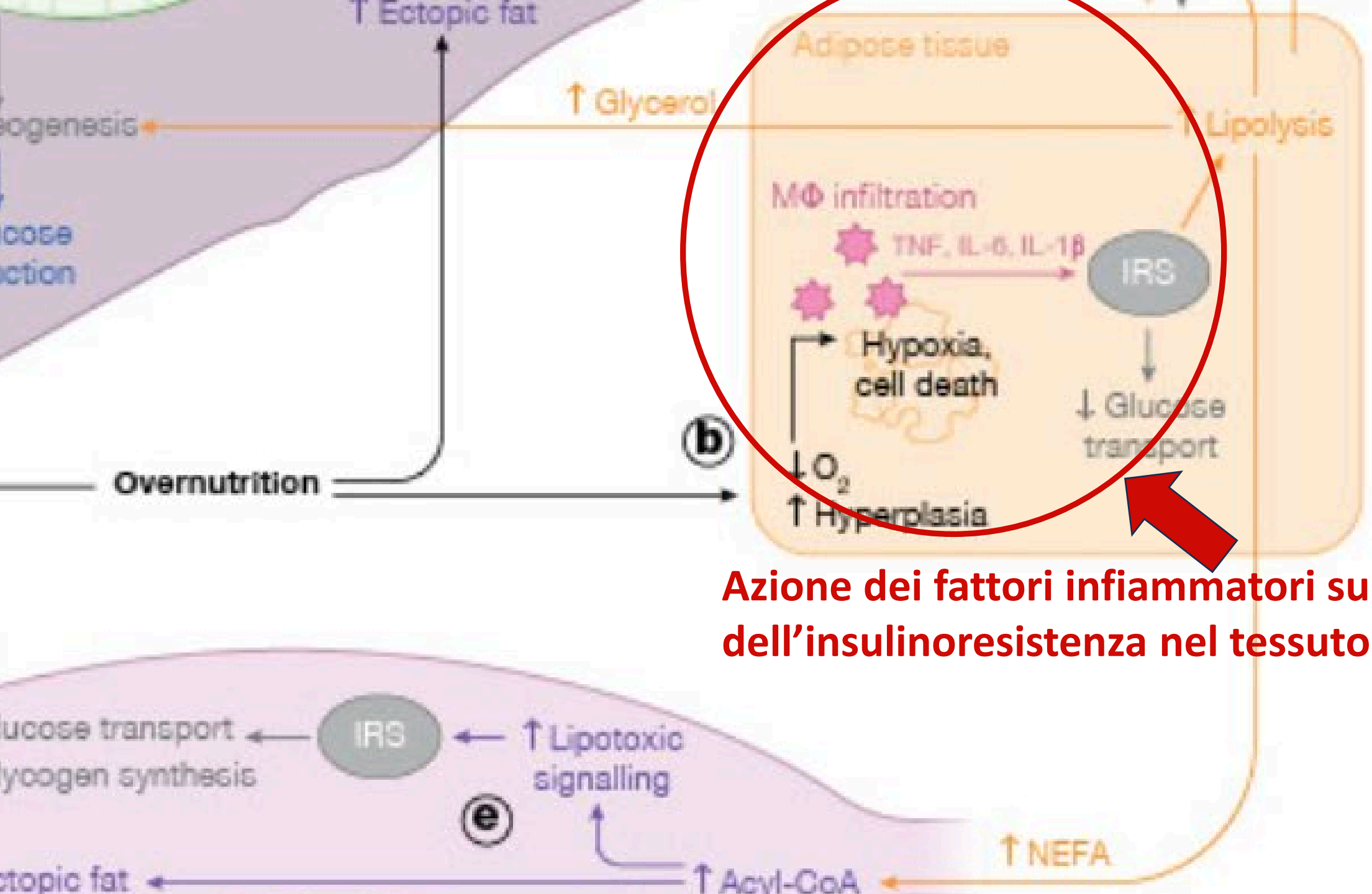
TABLE 2 Odds ratio (OR) and corresponding 95% confidence interval (CI)[a] for gestational diabetes (GDM) according to selected variables

	Univariate analysis				Multivariate analysis[b]			
	Gestational diabetes (GDM)				Gestational diabetes (GDM)			
	1st trimester		2nd trimester		1st trimester		2nd trimester	
Variables	OR (95% CI)	*P* value	OR (95% CI)	*P* value	OR (95% CI)	*P* value	OR (95% CI)	*P* value
Age (y)	1.02 (0.93-1.12)	.68	1.01 (0.92-1.11)	.78	1.01 (0.91-1.11)	.91	0.99 (0.90-1.10)	.89
BMI at 12 wk	1.13 (1.04-1.22)	<.01	1.14 (1.05-1.23)	<.01	1.02 (0.89-1.17)	.80	1.06 (0.92-1.21)	.45
Gestational weight gain at 12 wk (kg)	1.29 (0.94-1.78)	.11	0.94 (0.63-1.38)	.74	1.26 (0.89-1.84)	.19	0.82 (0.54-1.24)	.34
Subcutaneous adipose tissue (mm)	1.10 (1.03-1.17)	<.01	1.05 (0.98-1.13)	.17	1.04 (0.94-1.14)	.49	0.95 (0.86-1.06)	.36
Visceral adipose tissue (mm)	1.17 (1.08-1.28)	<.01	1.20 (1.10-1.31)	<.01	1.14 (1.01-1.28)	.04	1.19 (1.05-1.35)	.01
Multiparous	0.90 (0.38-2.12)	.80	1.31 (0.58-2.97)	.52	0.69 (0.26-1.86)	.47	1.20 (0.47-3.05)	.70
Family history of diabetes	0.84 (0.10-6.85)	.87	1.75 (0.36-8.44)	.48	0.50 (0.04-5.71)	.58	0.92 (0.12-6.84)	.93

[a]ORs and corresponding 95% CI were estimated by multinomial logistic regression models; non-GDM as reference group.

[b]Mutually adjusted.

Il tessuto adiposo viscerale misurato nel primo trimestre di gravidanza è predittivo di diabete gestazionale



Azione dei fattori infiammatori sull'aumento dell'insulinoresistenza nel tessuto adiposo

nutrients

MDPI

Article

Methylglyoxal, Glycated Albumin, PAF, and TNF-α: Possible Inflammatory and Metabolic Biomarkers for Management of Gestational Diabetes

Gabriele Piuri [1], Katia Basello [2], Gabriele Rossi [3], Chiara Maria Soldavini [3], Silvia Duiella [3], Giulia Privitera [3], Angela Spadafranca [3], Andrea Costanzi [2], Emiliana Tognon [2], Mattia Cappelletti [1], Paola Antonia Corsetto [4], Angela Maria Rizzo [4], Attilio Francesco Speciani [1,2,*] and Enrico Ferrazzi [1,3,5]

nutrients

MDPI

Article

Methylglyoxal, Glycated Albumin, PAF, and TNF-α: Possible Inflammatory and Metabolic Biomarkers for Management of Gestational Diabetes

Metabolita intermedio, precursore di prodotti di glicazione avanzata, si lega a proteine e DNA provocando stress ossidativo, mutazioni, apoptosi aumentato in presenza di iperglicemia

nutrients

MDPI

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Methylglyoxal, Glycated Albumin, PAF, and TNF-α: Possible Inflammatory and Metabolic Biomarkers for Management of Gestational Diabetes

		GDM Women		GDM Women	
	General Population	At Diagnosis	*p*	After 12 Weeks of Diet	*p*
MGO (μg/mL)	0.25 (0.19–0.28)	0.64 (0.46–0.90)	<0.001	0.71 (0.47–0.93)	<0.001
GA (nmol/mL)	0.95 (0.63–1.4)	1.12 (0.74–1.76)	ns	1.51 (0.88–2.03)	<0.001

Data are expressed as the median and interquartile range. MG, methylglyoxal; GA, glycated albumin.

E' significativamente aumentato rispetto ai soggetti gravidi non diabetici al momento della diagnosi e anche dopo 12 settimane di dieta rimane significativamente aumentato

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Article

Methylglyoxal, Glycated Albumin, PAF, and TNF-α: Possible Inflammatory and Metabolic Biomarkers for Management of Gestational Diabetes

E’ un prodotto in cui la glicazione avviene più rapidamente rispetto all’emoglobina

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Article

Methylglyoxal, Glycated Albumin, PAF, and TNF-α: Possible Inflammatory and Metabolic Biomarkers for Management of Gestational Diabetes

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Data are expressed as the median and interquartile range. MG, methylglyoxal; GA, glycated albumin.

L'albumina glicata non è differente al momento della diagnosi di GDM rispetto ai soggetti gravidi non diabetici, ma aumenta col passare delle settimane nonostante l'introduzione della dieta

Endocrine Reviews, 2022, 43, 763–793
https://doi.org/10.1210/endrev/bnac003
Advance access publication 18 January 2022
Review

A Clinical Update on Gestational Diabetes Mellitus

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[2]Faculty of Medicine and Health, University of Sydney, Sydney, Australia
[3]Diabetes in Pregnancy Team, Cambridge University Hospitals, Cambridge, UK
[4]Norwich Medical School, Bob Champion Research and Education Building, University of East Anglia, Norwich, UK
[5]Division of Women's Health, Kings College London, London, UK

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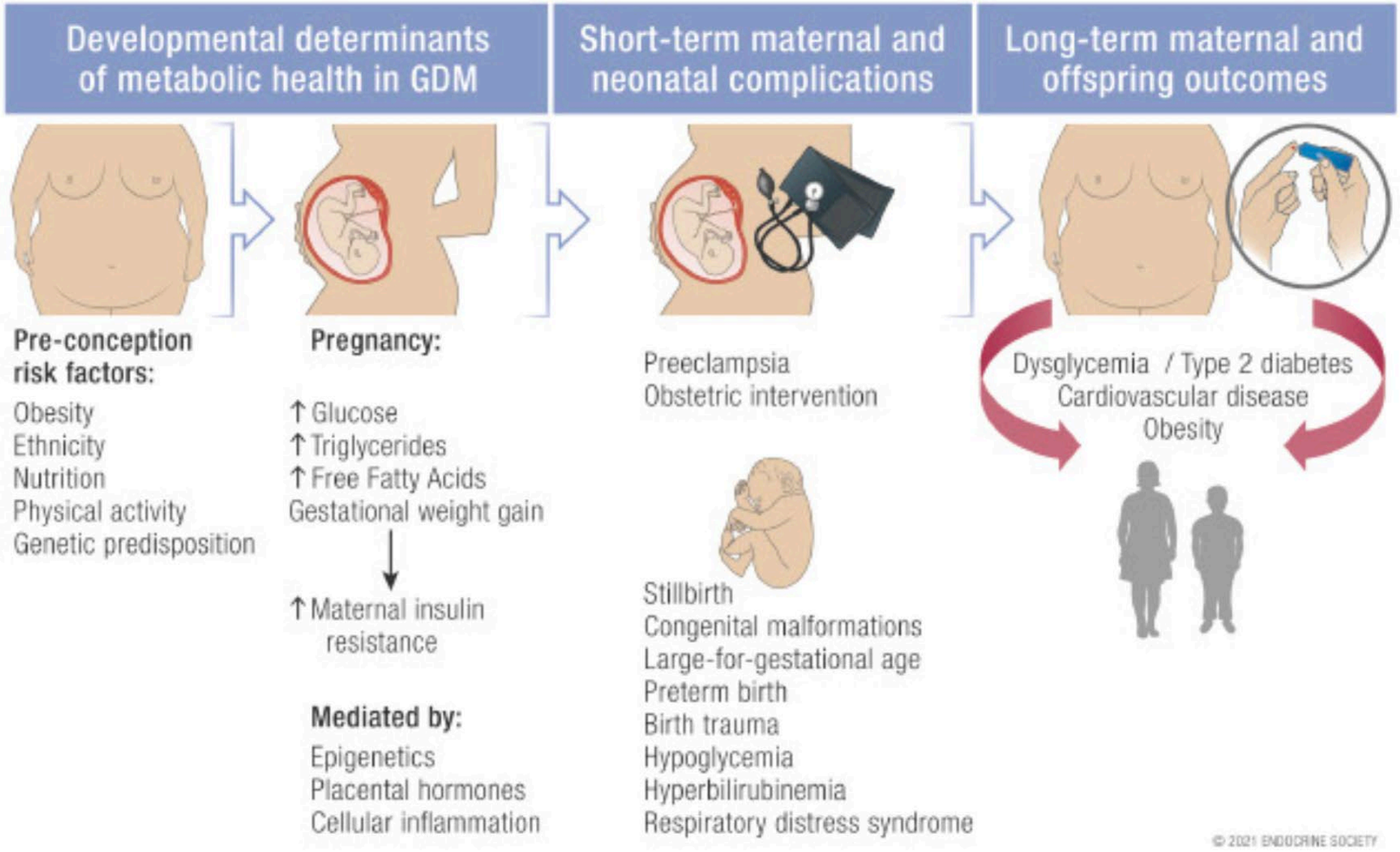
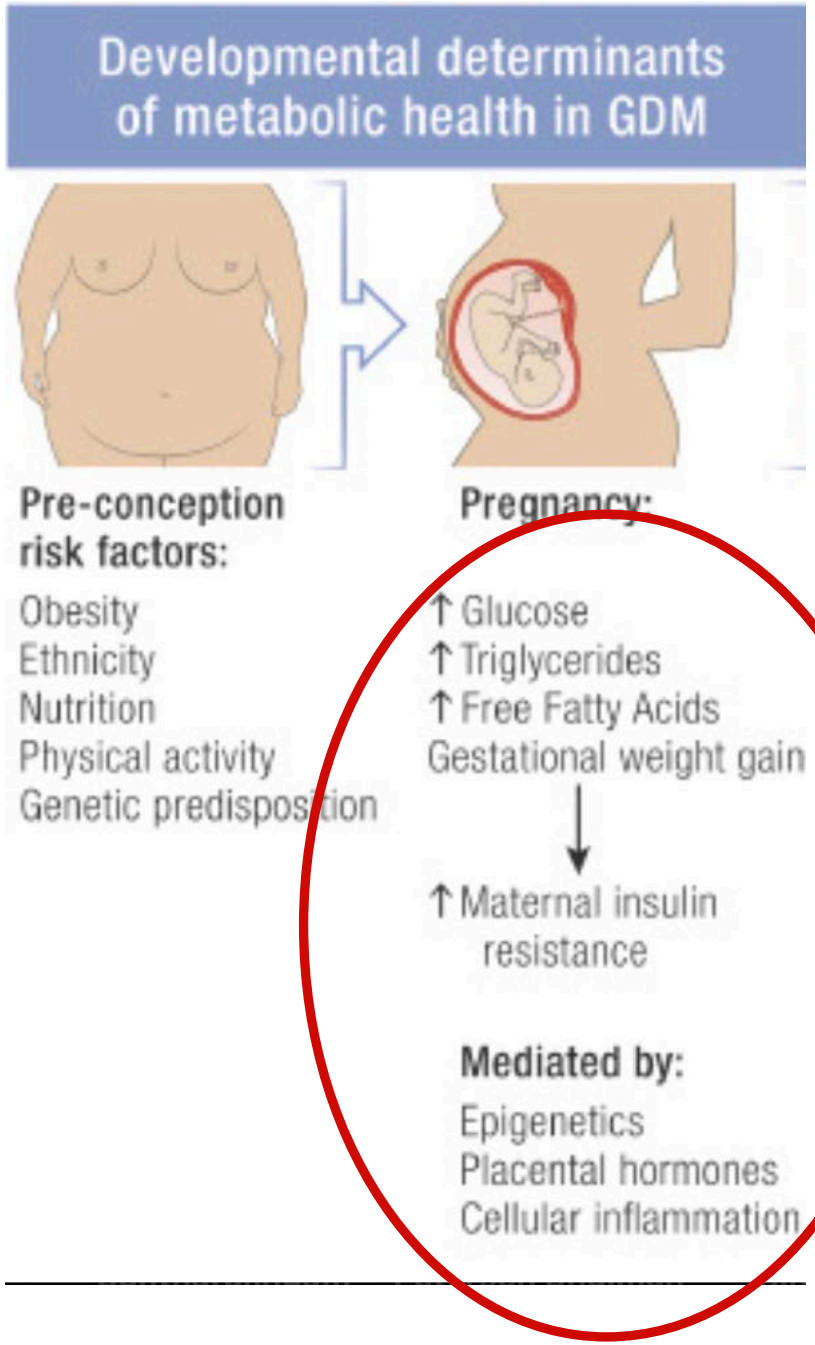
Graphical Abstract

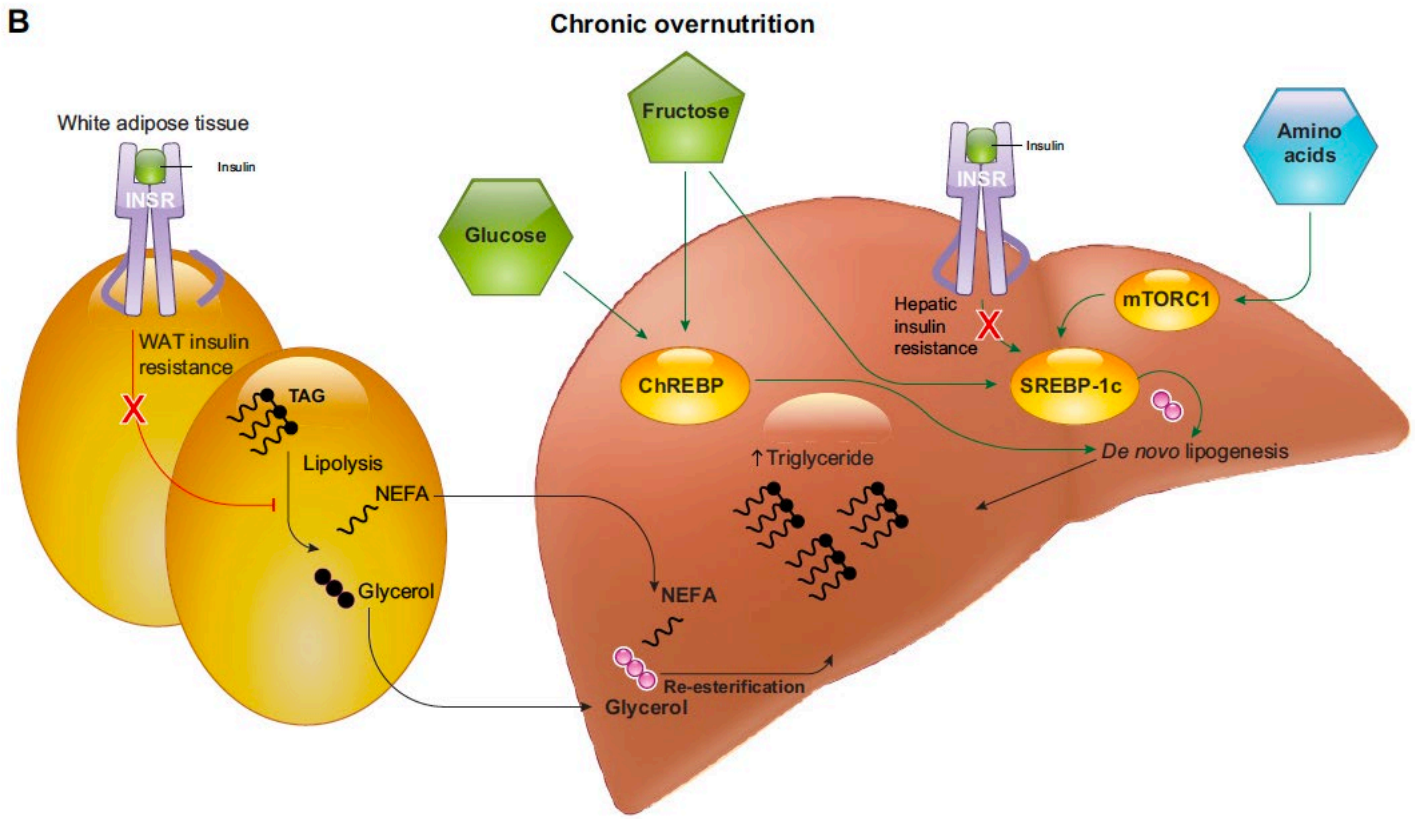


Key Words: gestational diabetes mellitus, diagnosis, pathophysiology, genetics, outcomes, management, precision medicine, biomarkers, diabetes prevention, COVID



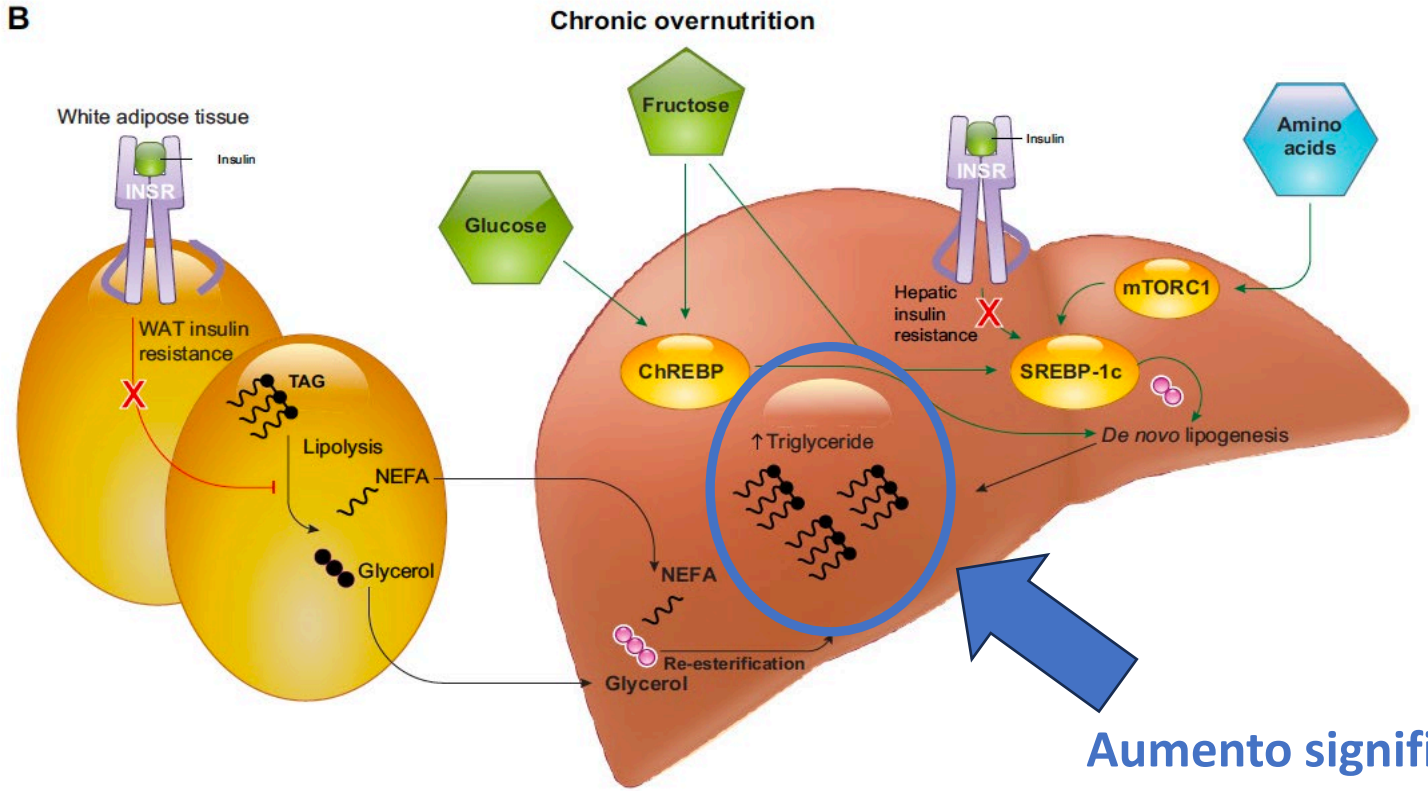
L'ipotesi di Pedersen-Mosted è sempre citata. Difficilmente si utilizzano clinicamente i trigliceridi e gli acidi grassi non esterificati

Nella gravidanza fisiologica l'azione dell'insulina è ridotta anche nel controllo del metabolismo lipidico, oltre che in quello glicemico



Amplificazione patologica dell'insulinoresistenza fisiologica della gravidanza

La disponibilità di trigliceridi ed acidi grassi liberi (FFA) nella gravidanza fisiologica ulteriormente aumentata da un difetto dell'insulina in condizioni patologiche amplifica la resistenza dell'azione dell'insulina nel diabete gestazionale



Aumento significativo dei Trigliceridi
Amplificazione dell'Insulinoresistenza

Steatosi Epatica Non Alcolica
Eccesso di substrati in condizioni di insulinoresistenza

Am J Physiol Endocrinol Metab 282: E522–E533, 2002.
First published November 6, 2001; 10.1152/ajpendo.00124.2001.

Downregulated IRS-1 and PPARγ in obese women with gestational diabetes: relationship to FFA during pregnancy

PATRICK M. CATALANO,[1] STEVEN E. NIZIELSKI,[3] JIANHUA SHAO,[2]
LARRAINE PRESTON,[1] LIPING QIAO,[2] AND JACOB E. FRIEDMAN[1,2]
Departments of [1]Reproductive Biology and [2]Nutrition, Case Western Reserve University School of Medicine, and MetroHealth Medical Center, Cleveland, Ohio 44106; and [3]Department of Nutrition, Texas A & M University, College Station, Texas 77843

Received 15 March 2001; accepted in final form 7 November 2001

Gli acidi grassi liberi (FFA) sono più elevati nei soggetti con diabete gestazionale

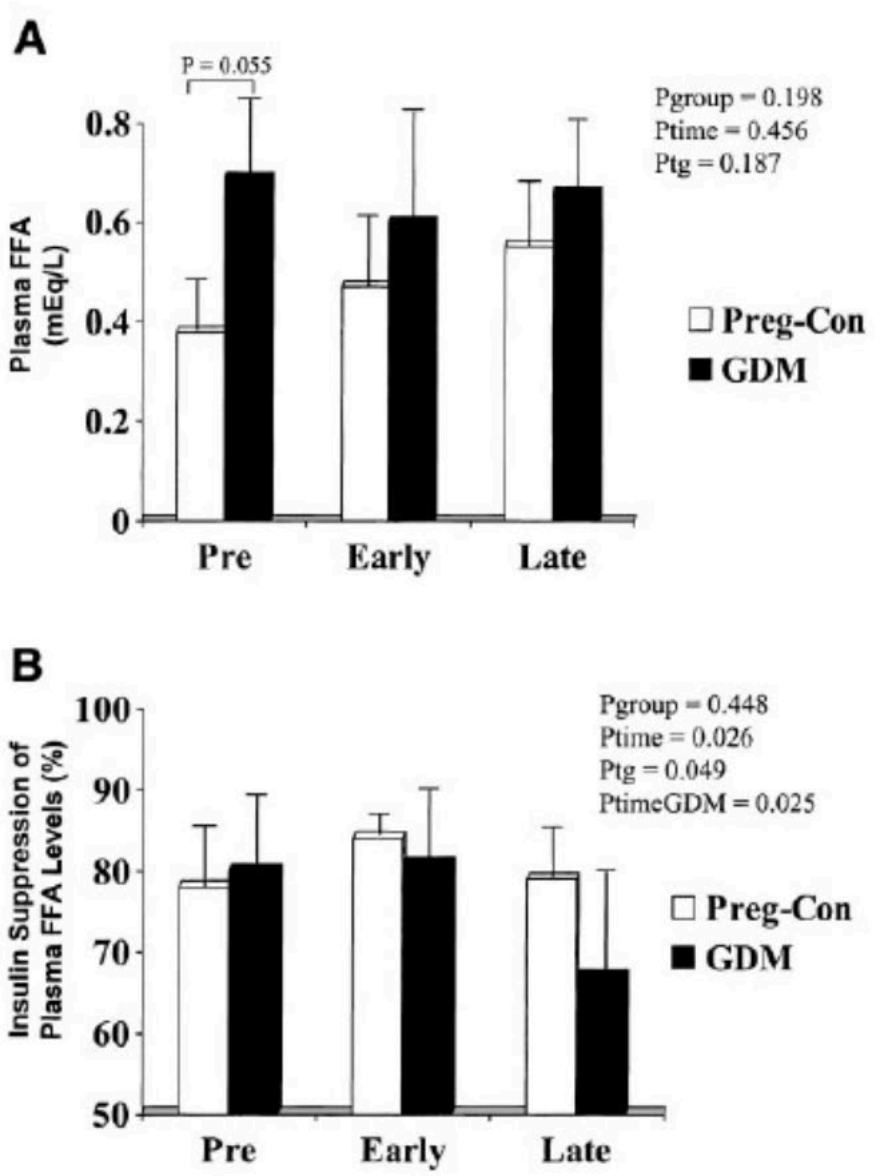


Fig. 1. Longitudinal changes in basal plasma free fatty acids (FFA; *A*), and insulin suppression of FFA (*B*) in pregnant-control (Preg-Con) and gestational diabetes mellitus (GDM) subjects. The data were analyzed by ANOVA and Fisher's protected least significant difference testing for post hoc analysis between groups. Data are means ± SD for Preg-Con (n = 4) and GDM (n = 5) subjects.

A termine di gravidanza, la capacità dell'insulina di ridurre i livelli di acidi grassi è significativamente minore nei soggetti con diabete gestazionale

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Maternal AA/EPA Ratio and Triglycerides as Potential Biomarkers of Patients at Major Risk for Pharmacological Therapy in Gestational Diabetes

Chiara Maria Soldavini [1,*], Gabriele Piuri [1], Gabriele Rossi [1], Paola Antonia Corsetto [2], Linda Benzoni [2], Valeria Maggi [1], Giulia Privitera [1], Angela Spadafranca [1], Angela Maria Rizzo [2,*] and Enrico Ferrazzi [1,3]

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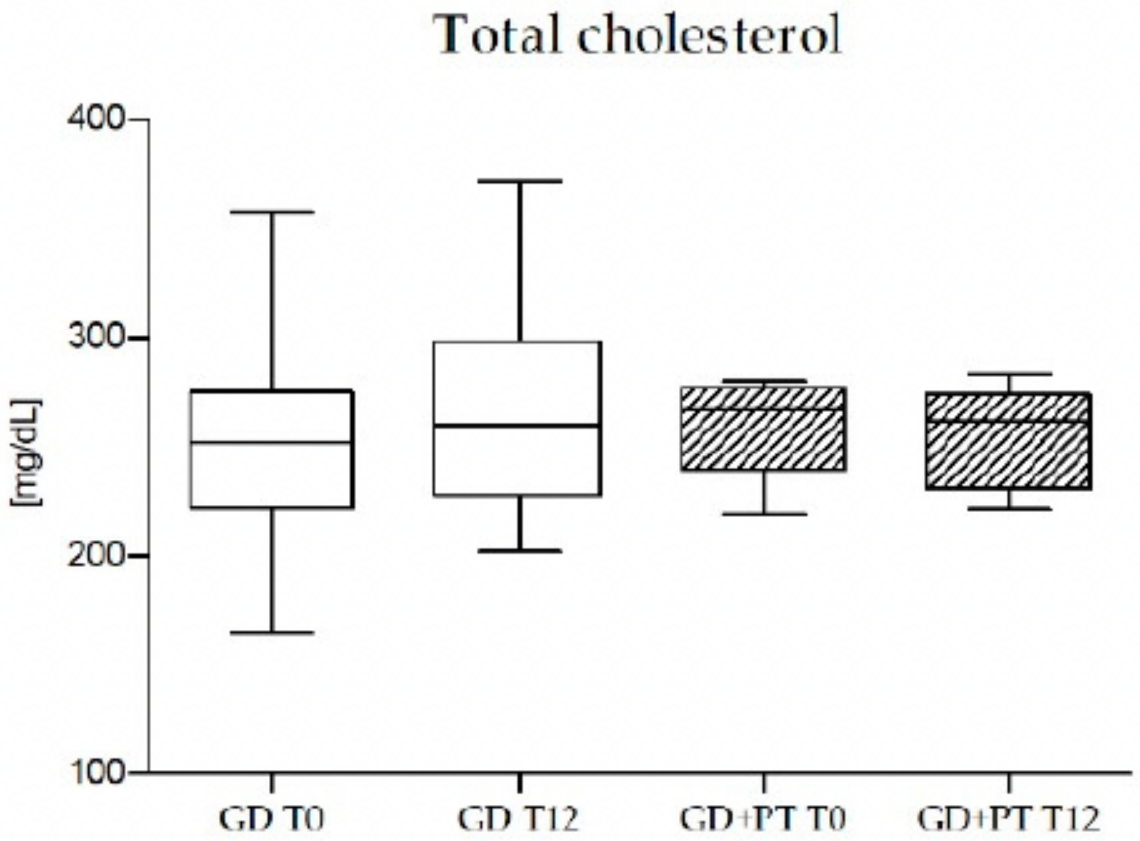
Article

Maternal AA/EPA Ratio and Triglycerides as Potential Biomarkers of Patients at Major Risk for Pharmacological Therapy in Gestational Diabetes

Il colesterolo totale non aumenta nei soggetti con diabete gestazionale in terapia farmacologica



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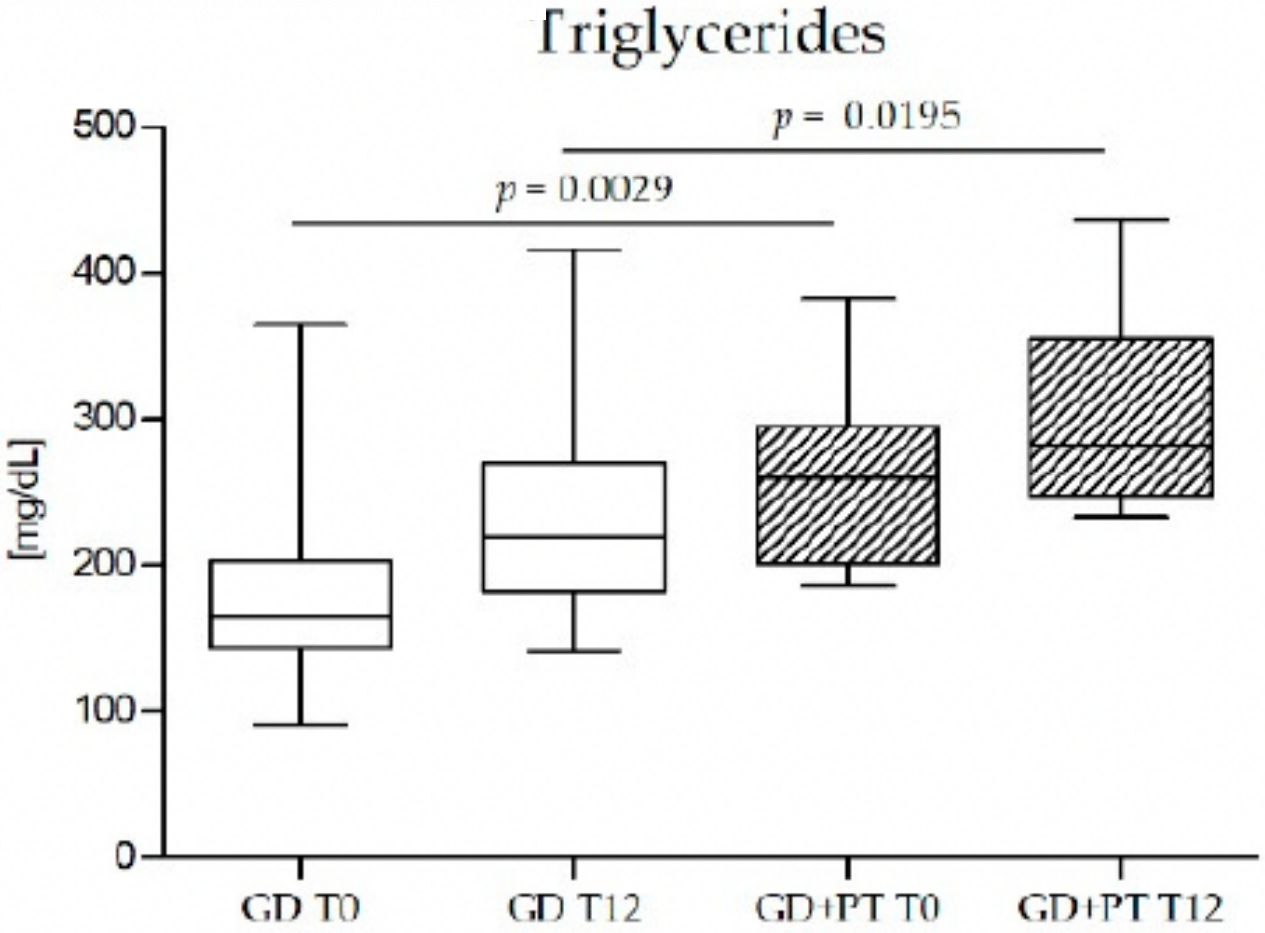
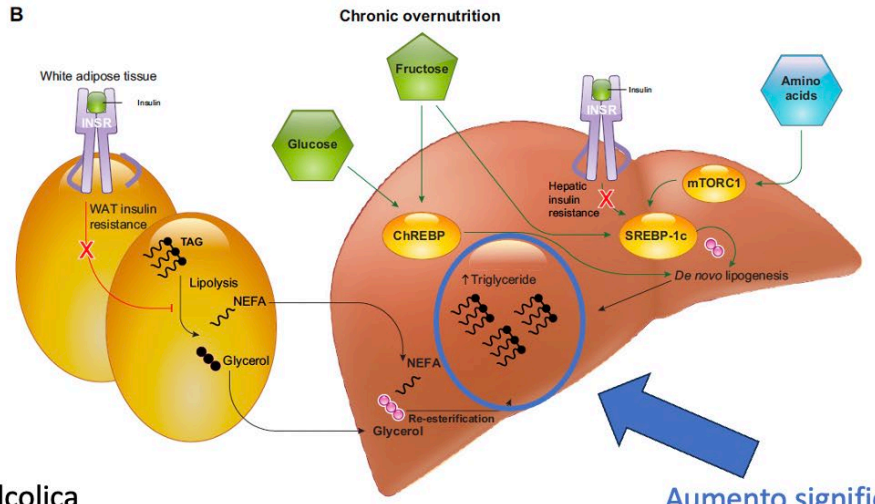
Article

Maternal AA/EPA Ratio and Triglycerides as Potential Biomarkers of Patients at Major Risk for Pharmacological Therapy in Gestational Diabetes

I trigliceridi sono significativamente aumentati nei soggetti con diabete gestazionale in terapia farmacologica

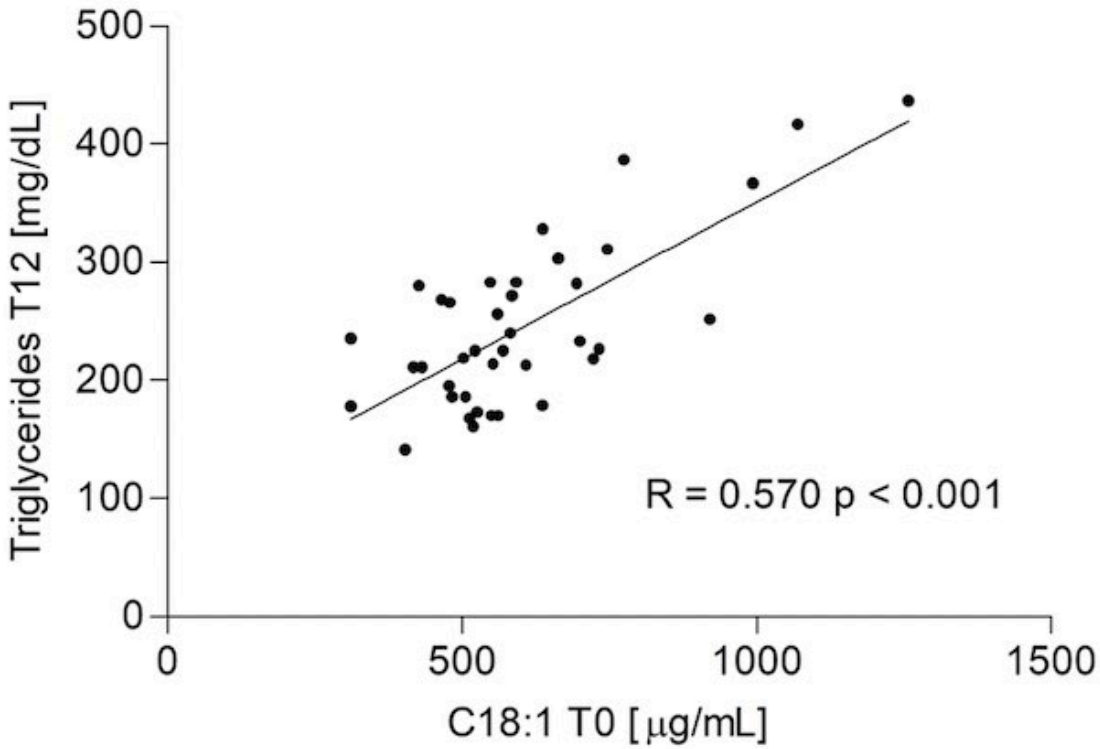




Steatosi Epatica Non Alcolica
Eccesso di substrati in condizioni di insulinoresistenza

Aumento significativo dei Trigliceridi
Amplificazione dell'Insulinoresistenza

I trigliceridi sono significativamente correlati ai livelli di oleato nei soggetti con diabete gestazionale



Conclusioni pratiche

- **I trigliceridi potrebbero rappresentare un mezzo poco costoso e facilmente applicabile nella pratica clinica per individuare i gradi più complicati di diabete gestazionale, ad esempio da sottoporre a terapia farmacologica**
- **I trigliceridi valutati nel I trimestre ed inseriti nei test di diagnosi prenatale eventualmente associati alla misurazione del tessuto adiposo viscerale potrebbero favorire una diagnosi precoce di GDM nel contesto di una sindrome metabolica gestazionale**
- **E' necessaria la curva di riferimento della gravidanza fisiologica(?) dei trigliceridi (possibilmente con uno studio multicentrico)**

metabolites

MDPI

Article

Adipose Tissue Insulin Resistance in South Asian and Nordic Women after Gestational Diabetes Mellitus

Ahalya Anita Suntharalingam Kvist [1,2], Archana Sharma [1,3], Christine Sommer [2], Elisabeth Qvigstad [1,2], Hanne Løvdal Gulseth [4], Stina Therese Sollid [5], Ingrid Nermoen [1,3], Naveed Sattar [6], Jason Gill [6], Tone Møller Tannæs [7], Kåre Inge Birkeland [1,2] and Sindre Lee-Ødegård [1,2,*]

L'indice di steatosi epatica non alcolica (NAFLD-LFS) è maggiore nelle pazienti del sud-est asiatico rispetto alle pazienti scandinave sia in condizioni di normoglicemia che in condizioni di pre-diabete/diabete di tipo 2

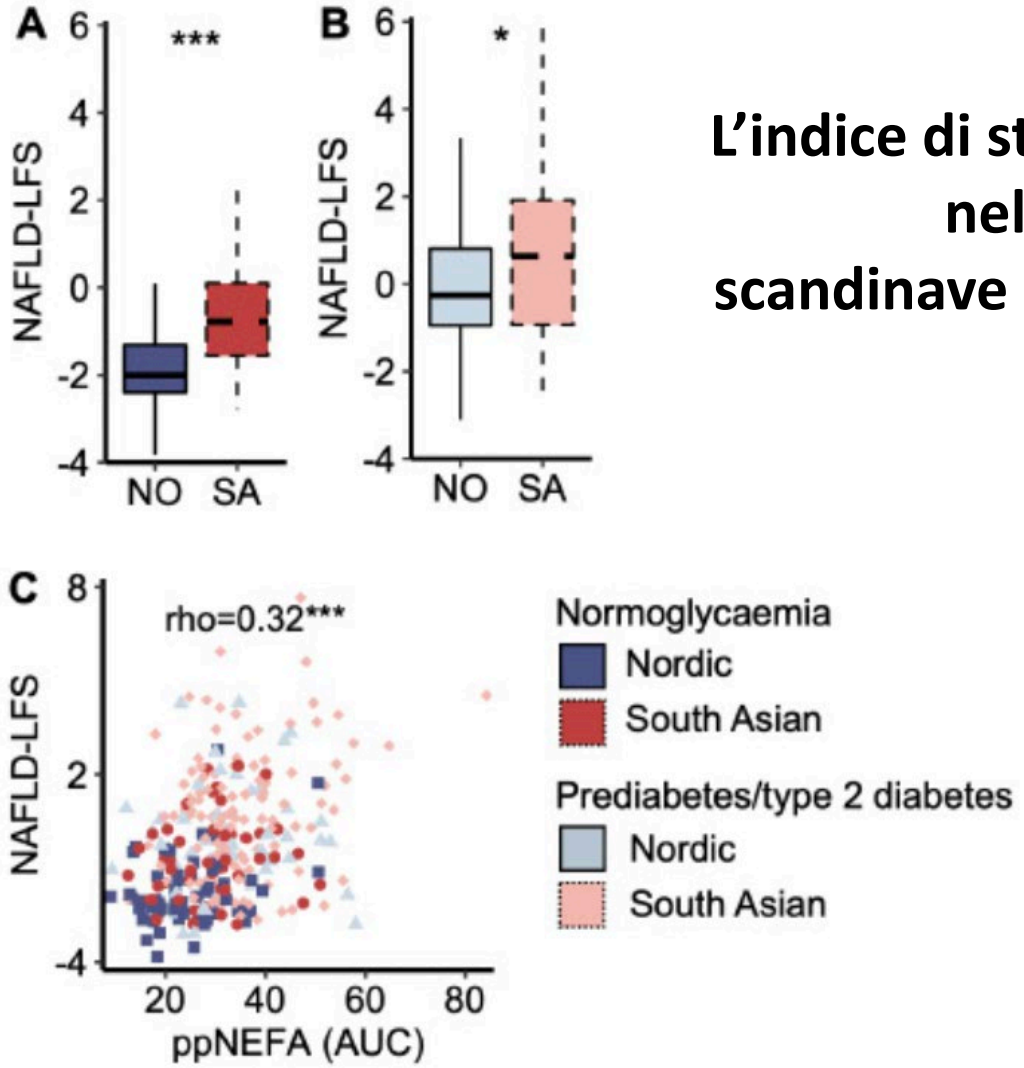


Figure 3. A marker of liver fat content. (**A**) The non-alcoholic fatty liver disease liver fat score (NAFLD-LFS) in Nordic and South Asian women with normoglycaemia and (**B**) prediabetes/type 2 diabetes. (**C**) A scatter plot of NAFLD-LFS scores and post-prandial (pp) non-esterified fatty acid (NEFA) concentration (area under the curve (AUC) from the oral glucose tolerance test (OGTT)). * $p < 0.05$ and *** $p < 0.001$. Box plots show medians, 25–75 percentiles, and min/max ranges. NO = Nordic. SA = South Asian.

L’indice di insulinoresistenza del tessuto adiposo (AT-IR) è maggiore nelle pazienti del sud-est asiatico rispetto alle pazienti scandinave sia in condizioni di normoglicemia che in condizioni di pre-diabete/diabete di tipo 2

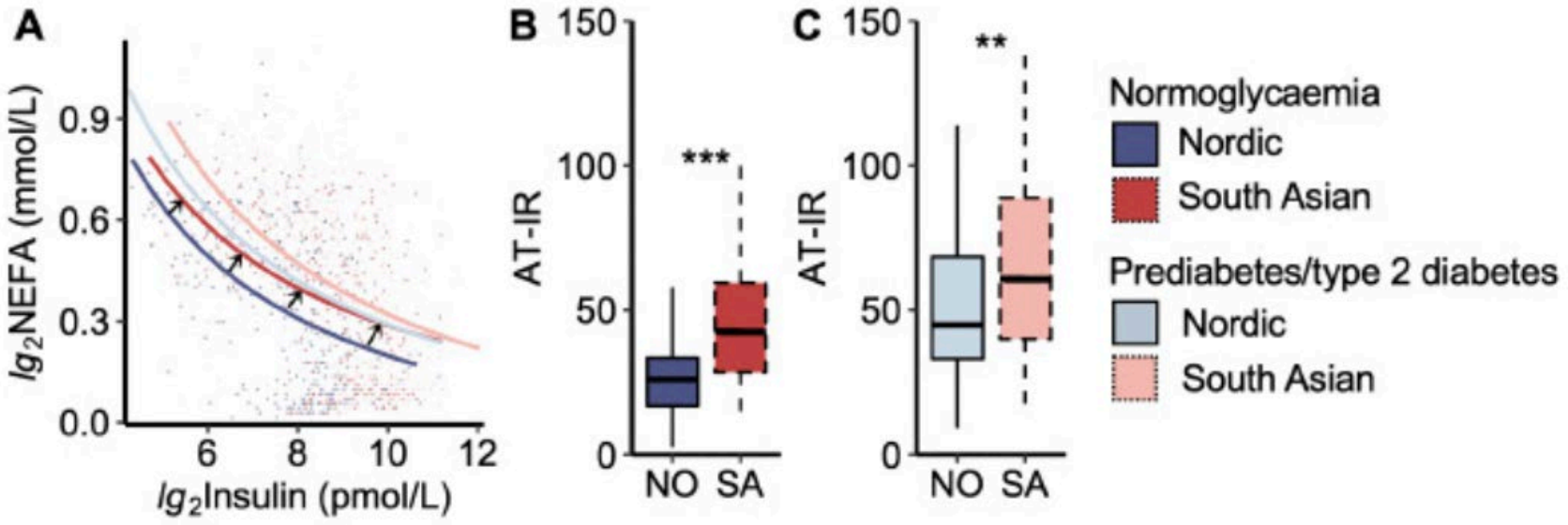


Figure 2. Adipose tissue insulin resistance index. (**A**) Plasma non-esterified fatty acid (NEFA) vs. insulin concentrations during the oral glucose tolerance test. The black arrows indicate that the curve for normoglycaemic South Asians is shifted upwards to the right compared to normoglycaemic Nordics, approaching the curves for the prediabetes/type 2 diabetes groups. The coloured dots represent each women. (**B**) The adipose tissue insulin resistance index (AT-IR), the product of fasting NEFA and insulin levels, in normoglycaemic women and (C) women with prediabetes/type 2 diabetes. NO = Nordic. SA = South Asian. Box plots show medians, 25–75 percentiles, and min/max ranges. ** $p < 0.01$, and *** $p < 0.001$ ethnic group difference.

Conclusione teorica

- **Una sindrome metabolica gestazionale potrebbe avere esiti non riferibili esclusivamente alla 'grossolanità della grossezza fetale', per cui è necessario un ripensamento dei parametri fetali, neonatali, infantili e della vita adulta a cui riferirsi per valutare l'intensità di tale alterazione e la conseguente necessità di diagnosi**